

AD-421 - Annual Research Progress Report Appropriated Projects

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Introduction

The AD-421 is an annual report of a project's research progress and accomplishments. The report consists of responses to seven Questions, a list of Associated Agreements, and a list of Publications summarizing the progress and accomplishments of the research project during the past fiscal year. The questions are designed to serve the reporting needs of the Agency as well as to provide progress updates for management's use. Some uses include, but are not limited to:

- Supporting the ARS budget request to Congress (significant accomplishments – “greensheets”).
- Reporting accomplishments against the ARS Strategic Plan [Government Performance and Results Act (GPRA)].
- Summarizing the major accomplishments of each National Program for inclusion in the National Program Annual Reports (NPARs)
- Enabling the ONP to respond to countless requests for information throughout the year.
- Retrospectively assessing the project's progress towards meeting the goals of the National Program (NP) and to report progress to the next NP Workshop. (by independent external panels and ONP)
- Informing the public by posting on the ARS website as well as the CRIS/NIFA website.

Note: These reports are not used by Headquarters for evaluation of personal performance.

The AD-421 system is open once a year during May through September for entering reports for appropriated projects.

In May, the Associate Administrator requests Research Project Reports (AD-421s) for the current fiscal year. The request provides general guidance on preparing the annual report and provides report due dates specific for each reporting year.

Management Units submit annual reports to the Area from May through September. Each Area may set up their own due dates to ensure sufficient time to review and forward their annual reports to ONP by October 1. It is very important to meet this deadline as many Agency reporting requirements which use the Annual Reports are due shortly after October 1.

Reports are required **annually** for all **active** projects, as well as any **expired** projects to complete the termination process.

Termination Process

ARS research projects exist a maximum of five years (60 months) duration. When an in-house “D” project expires, it is replaced by a new project and the funding is transferred to the new project, or the funding is redirected to another existing project. Once funding is transferred from the expiring project, the status of the project is changed to expired (“X”). The 421 Annual Report process is then used as the mechanism to complete the termination process.

Termination Steps:

- Headquarters PA expires (changes status to ‘X’) once new replacement project is established and all funding is transferred and enters associated comments.
- BPMS transfers the funds to an approved project (action is originally initiated by the MU).

- Project status in ARIS should then be expired (“X”), and NTL = \$0.
- During Annual Report season, the annual report is entered.
- On the Project Info screen, answer “Yes” to “**Would you like to terminate this project?**” and submit the annual report for approval electronically. By answering “Yes”, ARIS will automatically terminate the project at the end of the annual report cycle (approximately December/January). *(Note: See Pg. 6 for more information on termination questions)*

AD-421 Requirements

- **Annual reports for subordinate projects are no longer required. However, significant progress and significant accomplishments from subordinate projects should be included in the associated in-house project annual report.**
- All reports of progress on active projects should cover the period October 1 (or start date, if a new project) to September 30 (or expiration date if earlier than September 30).
- The Annual Report requirement applies to all in-house (D) projects.
- If the start date for a project is June, the scientist should describe the research that is in progress as much as possible, even though data may be limited. “No progress” is an unacceptable response. If a project begins in July, August, or September the annual report will be required on a case-by-case basis. Consult the Area Program Analyst for additional guidance.
- The Lead Scientist is responsible (with consultation of other SYs on the project) for providing the information for the 421 Report. Prior year reports should be provided to the scientist to use as reference in writing the current year’s report.
- If the project is terminating during the annual report cycle, Question 3 should be written as such, and briefly summarize the life of the project.
- **Note: Reports should be written with minimal technical jargon and written for a well-informed, non-technical reader. Scientists should explain their research and accomplishments in terms that average people can read and understand. No SY names or CRADA partners should be listed in the reports. Reports should be short and concise.**

Scientific Publications

- Only list publications for the current fiscal year, e.g. if reporting for fiscal year 2015, do not list any publications with an October 2015 publication date or later.
- Prior year publication(s) may be listed in this fiscal year’s reporting timeframe only if they were not listed in a prior reporting cycle.
- There is no length limitation for publication citations.
- If there are no publications to enter, leave the field blank. “None” or “No Publications” is unacceptable.
- Do not include a publication if it is not **in print**. “In Press” or “Accepted” are not acceptable.
- **Publications may be listed on multiple projects within the management unit, IF the research specifically relates to that project and associated scientists have contributed to the publication.**
- Co-authors, located in other management units, may include the publication(s) in annual reports for their own management units.
- Publications must include a complete journal citation.
- The ARS-115 log number is used to select each publication to be entered, therefore, there must be an

approved “ARS-115 Manuscript Approval” for every publication.

- Only Peer Reviewed Journal Articles (J); Review Articles (R) related to the subject of the project; Book or Book Chapters (B); Germplasm Registration Articles (H), or Natural Resources Research Update (U) can be listed under the publication section.
- ARIS will automatically check for use of publications in prior years (using 115 log numbers). If used in a previous year, ARIS will not allow inclusion in the current fiscal year. *In addition, once a 115 is used on a 421, the 115 will be marked as “Used on 421” for future reference.*
- See Pg. 20 for more information on Publications. For more information on citation format, see Chapter 5, Appendix 2 of the ARIS Online Handbook.

AD-421 Questions

(see Appendix B for more indepth information for scientists on each question)

- 1a. Background - Objectives (verbatim extract from the AD-416; no editing on the 421 is permitted).
- 1b. Background - Approach (verbatim extract from the AD-416; no editing on the 421 is permitted).
2. Milestones for FY2015 (currently approved milestones). (see pg. 9)
3. Progress Report (*report of progress for the fiscal year*)
4. Significant research accomplishments during FY 2015 (in order of importance). (*Note: NP code, Component, and Problem Statement from the NP Action Plan*)
5. List significant activities that support special target populations.
6. Technology Transfer (*list and give description of the technology transferred in the fiscal year*)
7. International Cooperation/Collaboration (*list any international cooperation/collaboration associated with the project*)

Associated (Subordinate) Agreements

Scientific Publications

Adding Annual Report Data:

- From the Research Documentation screen, click **Work** and **Annual 421 Reports** (fig. 1).
- The Annual 421 Records List screen opens with a list of the shells for the projects within the user's mode code that require an annual report (fig. 2).

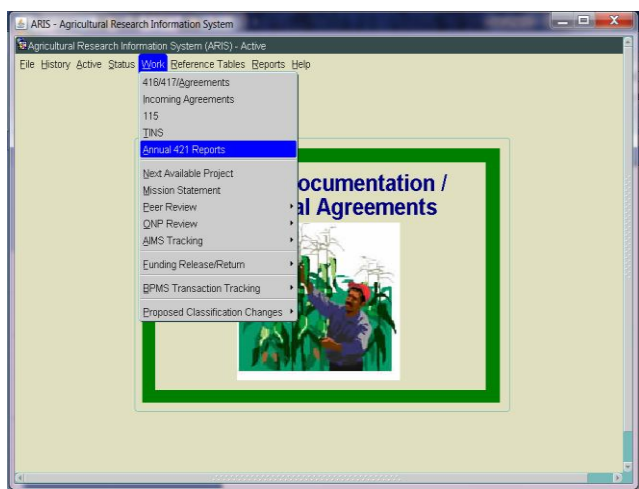


Fig. 1 – Research Doc, Annual 421 Reports

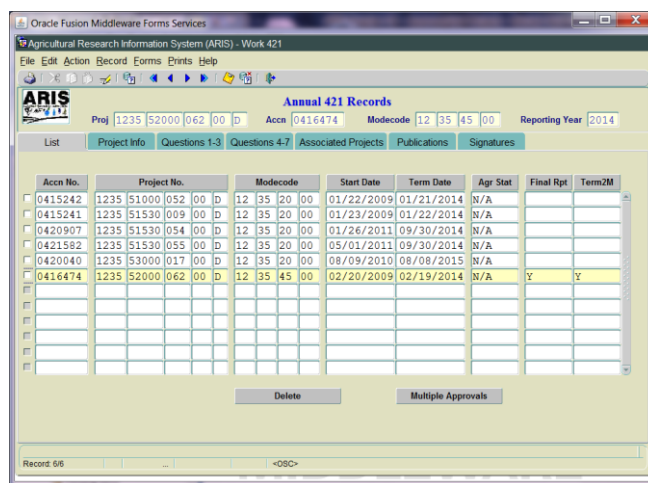


Fig. 2 – Annual Report List Screen

- From the List screen, place the cursor on the Project Number.
- Select the **Project Info** tab to display the Project Info screen (fig. 3).

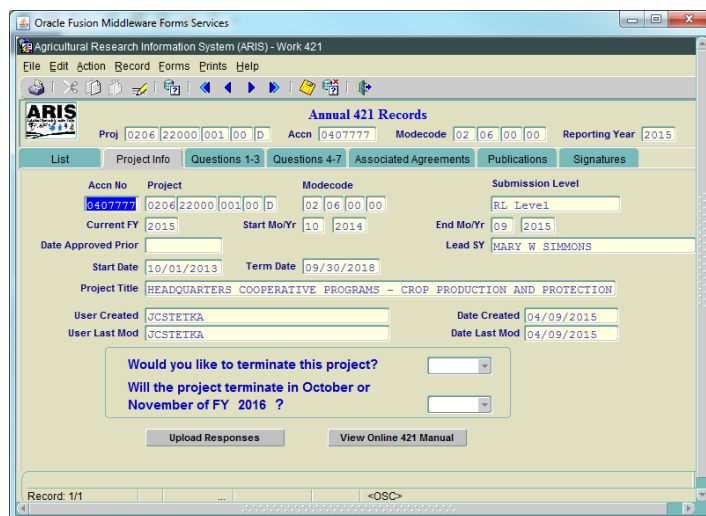


Fig. 3 – Project Info Screen

- Note:** A link has been added to link directly to the 421 chapter in the ARIS Online Manual (fig. 3).

- Answer the two termination questions as follows:
 - Answer **Yes** to “**Would you like to terminate this project?**” if:
 - project is past termination date and will not be extended; or
 - project is at five year maximum and cannot be extended; or
 - project will terminate within the first two months of the next fiscal year.
 - Otherwise, answer **No**.
 - A response is required.
 - Answer **Yes** to “**Will this project terminate in October or November of FY____,**” if the project will terminate within the first two months of the next fiscal year. This is referred to as a 2-month grace period.*
 - Otherwise, answer **No**.
 - A response is required.

*If a project expires (and will not be extended) within the first two months of the next fiscal year (reporting period), an annual report is not required for that next fiscal year. The current fiscal year’s annual report (421) will be the final progress report and should be written as such.

Data Entry Using a MS Word File (“Upload Responses”) (skip to pg. 8 if not using Upload Responses)

The AD-421 can be manually entered online by clicking from tab to tab and entering the data for each question. Or, it can be entered partially by importing a Microsoft (MS) Word file for Questions 3, 4, & 5 and then entering responses for Questions 2, 6, 7, and publications, which must be entered while online in ARIS.

Question 1a: System automatically inserts data

Question 1b: System automatically inserts data

Question 2: Manual entry online

Question 3: Load questions or manual entry online

Question 4: Load questions or manual entry online (**LOV must be used online to select NP/C/PS designation**)

Question 5: Load questions or manual entry online

Question 6: Manual entry online; system automatically inserts some data based on set criteria.

Question 7: Manual entry online

Associated Agreements:

System automatically inserts data; manual entry online as needed to add/delete agreements.

Publications:

System automatically inserts data; manual entry online as needed by selection of ARS-115 Log Number(s).

The following formatting instructions for the MS Word file must be followed for correct importing.

Formatting Instructions for MS Word File for Questions 3, 4, and 5:

- Question 3 must begin with the word “Question” and the number (3) followed by a colon (:) (e.g., Question 3:).
- Question 4 must be formatted by using the label “Accomplishment 1: or Accomplishment 2:, etc). **DO NOT USE “Question 4:” as a label for the accomplishments question** (see the example below). This format tells

ARIS to insert each response under the correct question. The responses should follow the label, starting on the next line. **NOTE: Each accomplishment should have a short title (in sentence case), followed by a period. The text of the accomplishment should immediately begin after the period (.) and two spaces. No hard return should be inserted. See example below.** For Question 4, be sure to put the accomplishments in priority order. The system will import them in order. Once imported, if the order is incorrect, they will have to be manually renumbered using the renumbering feature.

- Question 5 must begin with the word “Question” and the number (5) followed by a colon (:) (e.g., Question 5:).

IMPORTANT!! - MS Word software **MUST** be used with “auto numbering” and “Smart Quotes” turned off. (See Appendix A, Turning Off AutoFormat for Bullets, Lists, Outlines, Smart quotes).

Example of Format for Word file:

Question 3:

In FY 2011, the development of vaccines to increase the life expectancy of cows was tested and....

Accomplishment 1:

Vaccine to increase life expectancy. A vaccine was developed to increase life expectancy...

Accomplishment 2:

Vaccine to increase life expectancy of sheep. A vaccine was developed and tested to increase the life expectancy of sheep, to live for....

Question 5:

Target populations, including small farms, and underserved farms were addressed...

Once the Word file is complete and saved on your computer, go to the List screen. **Note:** You may want to set up a separate directory for the annual reports and save the files in a uniform manner, e.g., using the accession or project number as the file name. To make the uploading process quicker, save the files in a directory on your PC or in an external drive rather than on a network drive.

- From the List screen, find the project for which you want to enter a 421, and highlight it by placing your cursor on it or by placing a check in the box to the left of the project number.
- Select the **Project Info** tab. Click the **Upload Responses** button to open the dialogue box (fig. 4).

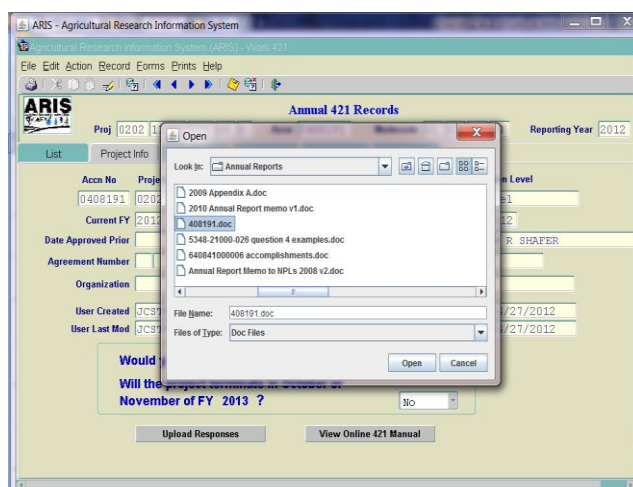


Fig. 4 – Upload Responses-Select file

- Click **Look in:** to find the directory and file name, highlight, then click **Open**.
- ARIS will automatically insert the response under each question and return to the Project Info screen. A dialogue box will tell you “**Press the OK button to start the upload**” (fig 5a). Press **OK**, and once complete, another dialogue box will tell you that the “**Document Processing is Complete**” (fig. 5b). Click **OK**. *Note: This process takes a few seconds. Do not press any keys until the "Document Process is Complete" message box is displayed.*

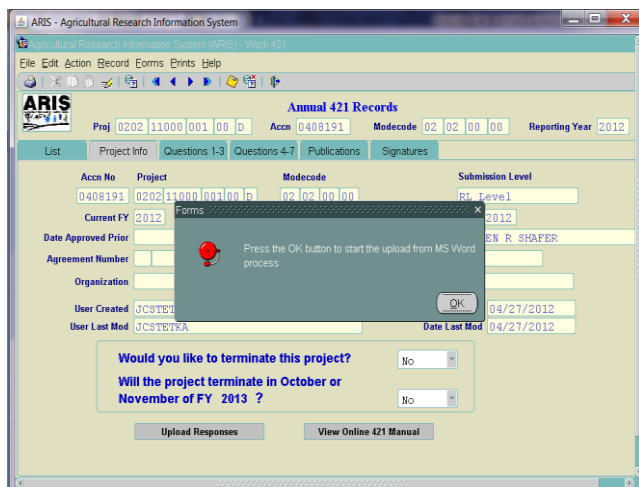


Fig. 5a – Upload Dialogue Box

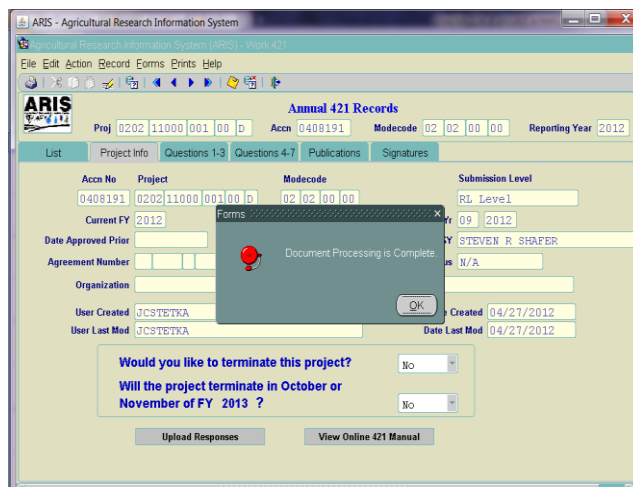


Fig. 5b – Upload Processing Complete

At this point, Questions 1a, 1b, 3, and 5 are now complete.

(Begin here if not using the Upload Responses feature)

- Select the **Questions 1-3** tab to begin entering responses (fig. 6).
- Question 1a and 1b are automatically populated. Click the **Response** button under Question 2 (fig. 6) to open the Milestones List screen (fig. 7).

ARIS - Agricultural Research Information System

Agricultural Research Information System (ARIS) - Work 421

File Edit Action Record Forms Prints Help

ARIS

Annual 421 Records

Proj 0202 11000 001 00 0 Accn 0408191 Modcode 02 02 00 00 Reporting Year 2012

List Project Info Questions 1-3 Questions 4-7 Publications Signatures

Question 1a
Objectives (from AD-416):
Response

Question 1b
Approach (from AD-416):
Response

Question 2
Milestones for FY2012:
Response

Question 3
Progress Report:
Response

Fig. 6 – Question 1-3

ARIS - Agricultural Research Information System

Agricultural Research Information System (ARIS) - Work 421

File Edit Action Record Forms Prints Help

ARIS

Annual 421 Records

Proj 0202 11000 001 00 0 Accn 0408191 Modcode 02 02 00 00 Reporting Year 2012

Milestones

Milestone No	Milestone	Substantially Fully Met	Met	Not Met	Explanation
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Add Milestones Edit/View Milestones Delete Milestone Renumber Milestones Close

Fig. 7 - Milestones List Screen

- Click the **Add Milestones** button to display the Milestone Details screen (fig. 8a).

ARIS - Agricultural Research Information System

Annual 421 Records

Proj 020211000001000 Accn 0408191 Modecode 02 02 00 00 Reporting Year 2011

Milestones

☐ No Milestones for FY

Milestone: ☐ Fully Met ☐ Substantially Met ☐ Not Met

Reason Not Met (if applicable):

Description

Explanation

Save Cancel

Fig. 8a – Milestones Details Screen

ARIS - Agricultural Research Information System

Annual 421 Records

Proj 020211000001000 Accn 0408191 Modecode 02 02 00 00 Reporting Year 2011

Milestones

Milestone: ☐ Fully Met ☐ Substantially Met ☐ Not Met

Reason Not Met (if applicable):

Description

Explanation

Save Cancel

Fig. 8b – List of Values – Reason Not Met

- The Milestone Number will be automatically generated.
- Enter the milestone description using complete sentences.
- Enter a brief explanation in the “explanation” box provided (optional). **DO NOT** enter the explanation in the Milestone description box.
- Check only one status box (fully met, substantially met, or not met). If not met, provide the reason by clicking the “?” and selecting the reason from the LOV (fig. 8b). *In addition, if “not met” is selected, a brief explanation as to why not met should be provided in the Explanation field.*
- Click **Save** to return to the previous screen where the milestone will now be displayed.
- Continue adding all the milestones that were to be addressed in the FY. When finished, click **Close** to return to the Questions screen.
- If no Milestones were to be addressed in the FY, click the **Add Milestones** button, check the **No Milestones for FY** box, and provide a brief explanation in the “explanation” box as to why there were no Milestones (fig. 8c).

ARIS - Agricultural Research Information System

Annual 421 Records

Proj 020211000001000 Accn 0408191 Modecode 02 02 00 00 Reporting Year 2011

Milestones

☒ No Milestones for FY

Milestone:

Description

Explanation

Save Cancel

Fig. 8c – No Milestones for FY

Renumbering Milestones:

- If Milestones need to be reordered, from the Milestones List screen (fig. 8d), click the **Renumber Milestone** button, and the Renumbering screen will be displayed (fig. 8e).
- Enter the correct Milestone number(s) in the **New Milestone No.** field for each Milestone and click **Save** and **Close** (fig. 8f).

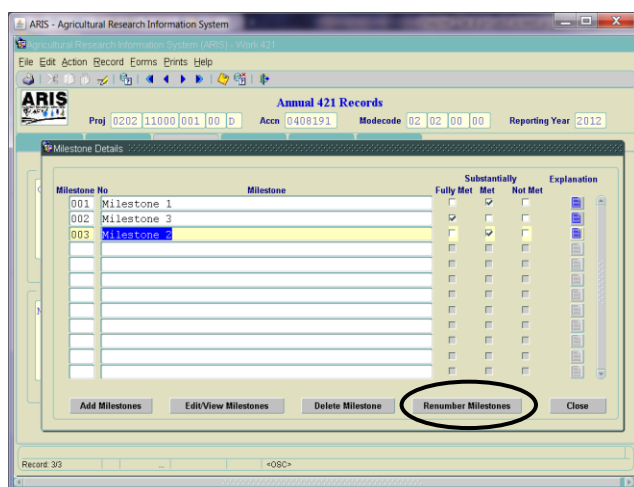


Fig. 8d – Milestones List Screen

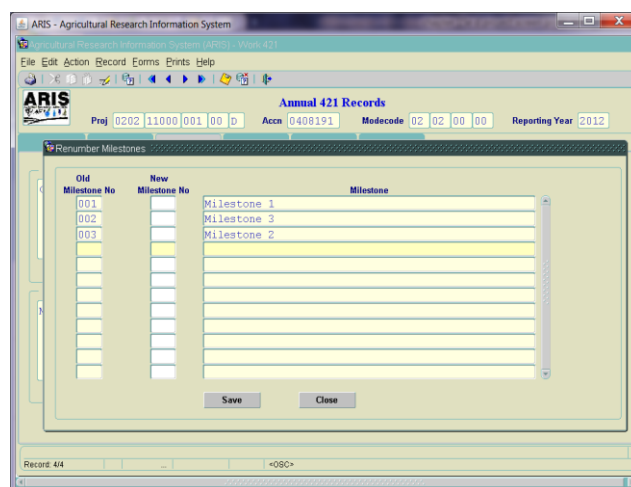


Fig. 8e – Renumber Milestones

- The system renumbers the Milestones accordingly (fig. 8g).
- If Milestones are deleted, the system will automatically renumber the remaining milestones accordingly.
- Select **Close** to move to Question 3.

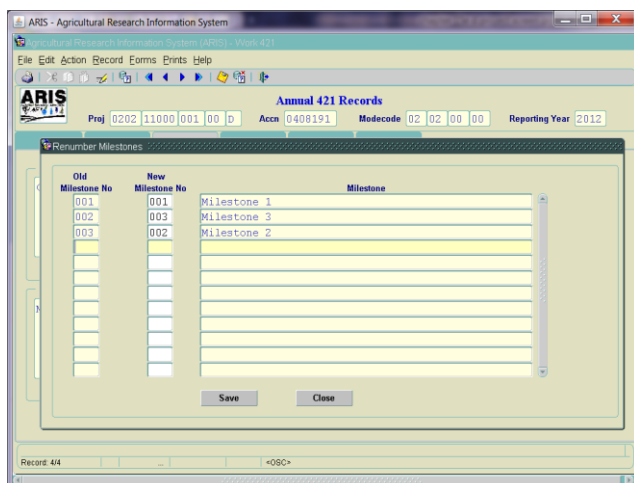


Fig. 8f – Milestone Renumbering

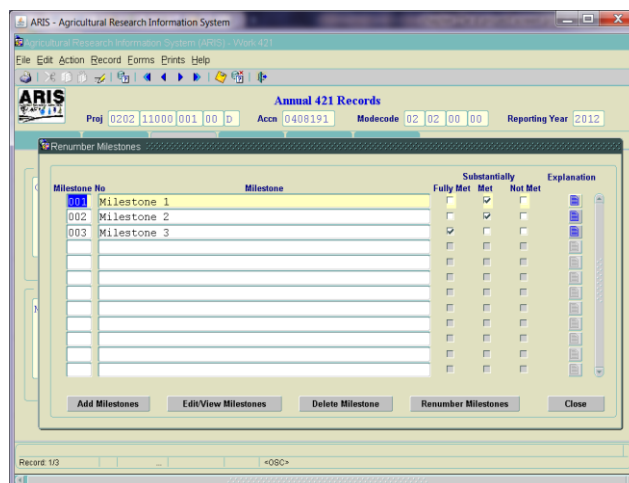


Fig. 8g – Milestone Renumbering - Complete

Question 3: Progress Report

- If "Upload Responses" was used, the Progress Report will be displayed when selecting the Response button under Question 3. If Upload Responses was not used, enter the progress report in the space provided (fig 9).
- The Progress Report field has been increased to 10,000 characters to allow for inclusion of significant

subordinate project progress, as necessary.

Fig. 9 – Progress Report

- When completed, click **Save** and **Close** to return to the Question 1-3 screen.

Question 4: Accomplishments

- Select the **Questions 4-7** tab.
- Click the **Response** button under Question 4. If “Upload Responses” was used, the accomplishments will be listed here (fig. 10a). If not, click the Add Accomplishment button, and enter the Accomplishment and Save (fig. 10b). The accomplishments will be automatically numbered. **NOTE: Each accomplishment should have a short title (in sentence case), followed by a period. The text of the accomplishment should immediately begin after the period (.) and two spaces. No hard return should be inserted.**

Fig. 10a – Accomplishments List Screen

Fig. 10b - Accomplishment Entry Screen

- Click the arrow next to the accomplishment (fig. 10a) to go to the NP/Component screen (fig. 10c). NP/C/PS must be selected for each Accomplishment listed. **NOTE: This is a required field. Be sure to accurately select the correct NP/C/PS for the correct Action Plan year.**

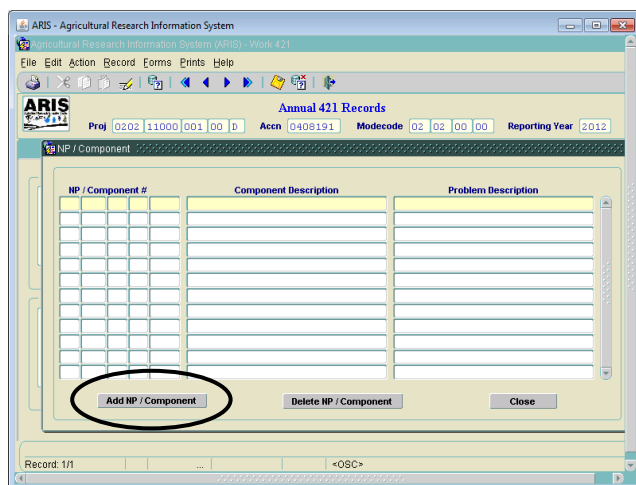


Fig. 10c – NP/Component Screen

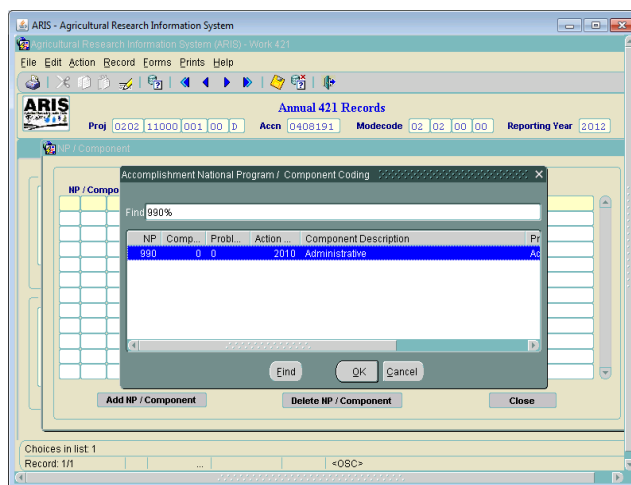


Fig. 10d – NP/Component LOV

- Click the **Add NP/Component** button to display the LOV for NP/C/PS selection (fig. 10d).
- Select the appropriate NP/C/PS and click **OK**.
- The selection will be inserted in the NP/Component screen (fig 10e). (**Note:** More than one NP/C/PS can be selected, however, it is preferable to limit the number). (**Note:** Only the NPs listed on the project will be displayed for selection.)

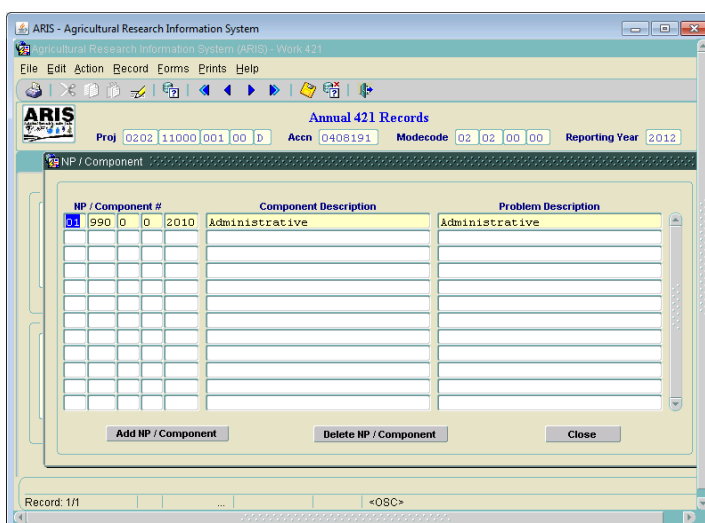


Fig. 10e – NP/Component - Completed

When completed, click **Close** and **Close** to return to the Question 4-7 screen.

NOTE: A Renumbering option has been added to Question 4. If Accomplishments are deleted, the system will automatically renumber the Accomplishments. However, if Accomplishments need to be inserted and/or reordered, follow the same procedures as with Question 2 for Renumbering (pg. 11).

Question 5: Significant Activities that Support Special Target Populations:

- Click the **Response** button under Question 5. If “Upload Responses” was used, the response will be listed here (fig. 11). If not, add the response and **Save**.
- If there are no activities that are appropriate for this question, state “none”.

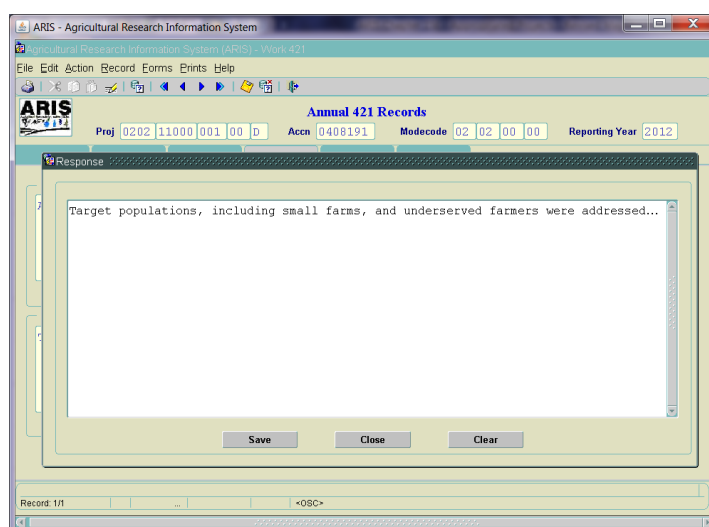


Fig. 11 – Special Target Population Activities

Question 6: Technology Transfer

- Click the **Response** button under Question 6 and the Technology Transfer Numerics screen will be displayed (fig. 12a).

The screenshot shows the ARIS - Agricultural Research Information System interface. At the top, the title bar reads "ARIS - Agricultural Research Information System". Below it, a menu bar includes "File", "Edit", "Action", "Record", "Forms", "Prints", and "Help". A toolbar with various icons is visible. The main window displays "Annual 421 Records" with fields for "Proj" (0202), "11000", "001", "02", "M", "Acen" (0408491), "Modcode" (02, 02, 00, 00), and "Reporting Year" (2010). The "Technology Transfer" section contains a list of metrics, each with a numeric input field and a description:

- Number of New CRADAs
- Number of Active CRADAs
- Number of New/Active MTAs (providing only)
- Number of Invention Disclosures Submitted
- Number of New Patent Applications Filed
- Number of New Germplasm Releases
- Number of New Commercial Licenses Executed
- Number of Web Sites Managed
- Number of Other Technology Transfer

A blue callout bubble points to the numeric input fields with the text: "Numerics cannot be entered directly on this screen". A "Close" button is at the bottom right of the form. The status bar at the bottom shows "Record: 1/1" and "<OSC>".

Fig. 12a - Question 6 – Technology Transfer

- For each of the numeric fields on this screen, the number will automatically propagate in based on the supporting data entered on the Details screens. The numerics CANNOT be entered or modified directly on the Numeric screen.
- For the first seven items on the screen, data will automatically populate the Details screens based on the criteria determined for each numeric (see table below for set of criteria).

Numeric	Data Automatically Propagated	Criteria
New CRADAs	Agreement No., Title, and Cooperator	Start date in FY of report; Status = Active
Active CRADAs	Agreement No., Title, and Cooperator	Start date < in FY; Status = Active
New/Active MTAs (Providing Only)	Trans ID and Material Transfer Description (only new MTAs propagate; all are in LOV for selection)	Providing or Select Agent Providing; Status = not In Negotiations or not Abandoned
Invention Disclosures Submitted	Docket No. and Title (only current FY data propagates in; prior year data in LOV for selection if needed)	FY in Report Year; Utility Invention (U); Plant invention (P); Plant Material is a candidate for Plant Protection (PVPC and/or Patent = Yes + application date is blank
New Patent applications Filed	Docket No. and Title (only current FY data propagates in; prior year in LOV)	Application date within FY of report (Plant or Utility inventions)
New Germplasm Releases	Docket No. and Title (only current FY data propagates	Plant inventions; FY in report year; and Plant material is a candidate for Plant Protection

	in; prior year in LOV)	(PVPC and/or Patent) = No or Null
New Commerical Licenses Executed	Docket No. and Title (only current FY data propagates in; prior year in LOV)	Issue date is in FY of report
Web Sites Managed	None	In FY
Other Technology Transfer	None	Technology transferred in FY of report

- If data did not propagate in to the first seven numeric fields and details screens, it means that nothing fit the criteria to be added in that category for the fiscal year report. Therefore, no additional information needs to be entered.
- If data is populated in, the Title, Cooperator, and Patent, License or Agreement # fields are already filled in. Next, the Description field must be filled in describing the technology transferred, by answering the following questions for each technology:

Description of the Technology; **(Technology)**

Description of the Transfer; **(Transfer)**

Description of the Customer/User; and **(Customer/User)**

Demonstrated or Anticipated Impact and/or Outcome **(Impact and/or Outcome) (IMPORTANT)**

- Use the labels which are shown in () above, prior to the response for each answer. (see Appendix C for response examples).
- To enter the required description information, click the notepad next to the line item (fig. 12b). The Technology Transfer List screen for that numeric will be displayed, which will already have data propagated in (fig. 12c).

Fig. 12b – Tech Transfer screen w/Numerics

Fig. 12c – Tech Transfer List Screen

- Click the **Edit/View** button to display the Technology Transfer Details Screen (fig. 12d).

Fig. 12d – Tech Transfer Details Screen

- Enter the required information (with labels) in the Description field by manually typing or pasting in from MS Word. Maximum character length is 2,000 characters per description. **However, the responses should generally not be that long.**
- Once data entry is complete, click the **Save** button to return to the Tech Transfer List screen.
- Once data entry is complete for all line items, click the **Close** button to return to the Tech Transfer Numerics screen.
- Continue adding/completing the information for **all** technology transfer items in the same manner.
- If data is entered for the last two numerics (Web Sites Managed and Other Technology Transfer), the Description field must also be filled in, answering the same four questions. Data for these two items is not automatically populated and must be entered manually.

NOTE: If data is not available or no technology has been transferred to date, it is okay to answer “**no impact to date**”.

Question 7: International Collaboration

- Click the **Response** button under Question 7 to display the Intl Cooperation/Collaboration List screen (fig. 13a).
- International cooperation and/or collaboration (formal and informal) includes agreements with foreign countries and/or any other International cooperation, which may or may not be associated with an “official” agreement.
- If there is no International cooperation, go directly to the **Associated Agreements** tab.
- Click the **Add Collaboration** button to display the Intl Collaboration Details screen (fig. 13b).

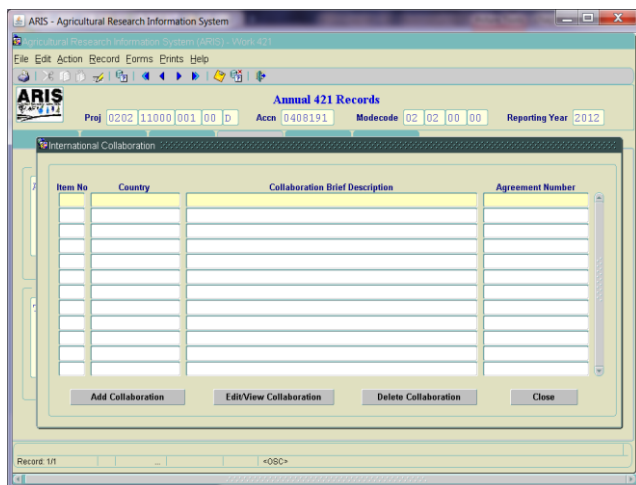


Fig. 13a – Intl Collaboration List Screen

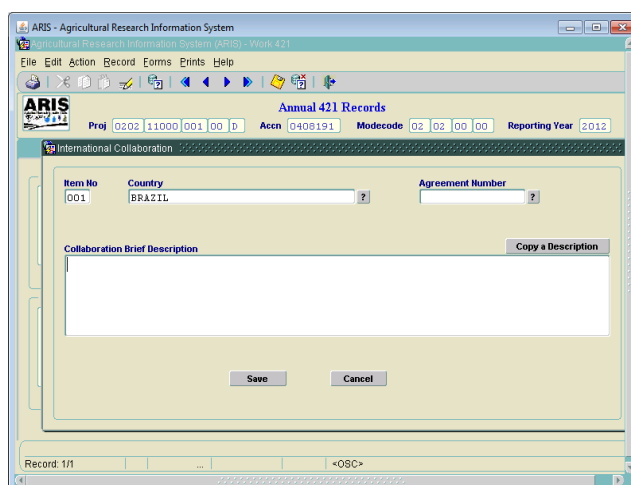


Fig. 13b – Intl Collaboration Details Screen

- Enter Item No., select the country from the LOV, select an agreement number, if applicable, and give a brief description of the cooperative/collaborative effort (1,000 character maximum per item).
- Enter separate line items for each collaborative effort. After each addition, click the save button.
- Each country and/or collaborative effort should be entered separately. If the same collaboration is done with multiple countries and the description is the same, select the **Copy Description** button (fig. 13b) after the first country is entered to copy the same description to multiple line items.
- A List of Values is displayed (fig. 13c). Select the appropriate collaborative description and click **OK**. The description will be inserted into the Details screen (fig. 13d).
- After all collaborations have been entered, click **Close**.

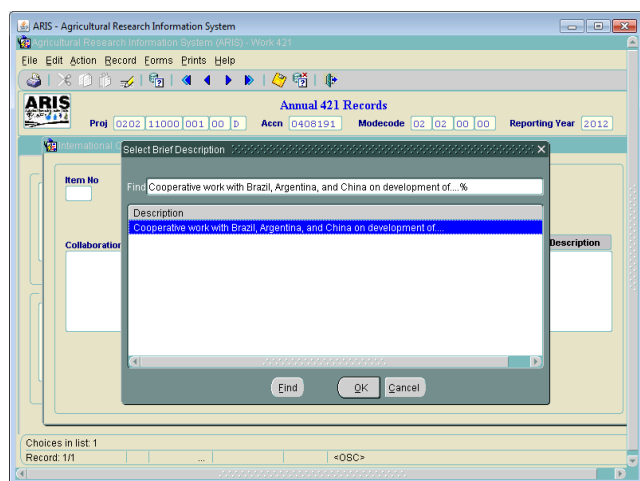


Fig. 13c – Copy Description LOV

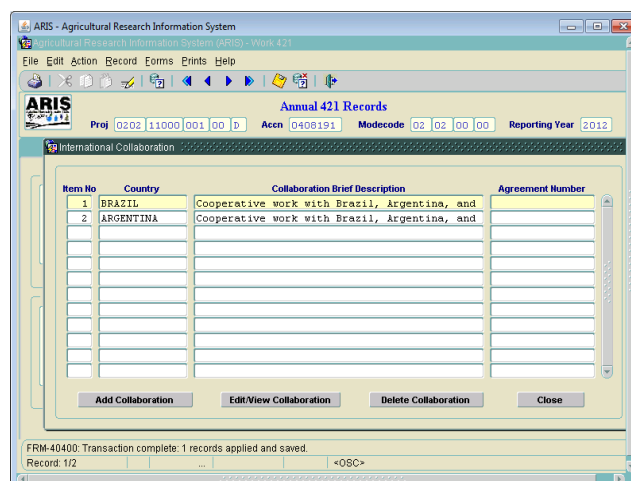


Fig. 13d – Intl Collaboration - Completed

NOTE: Each entry should include a description of the collaboration/cooperation, including the name of the international institution and a brief description of the research and the overall objectives of the activity. Scientist names should not be listed.

Associated Agreements:

The Associated Agreements tab has been added to incorporate connection to all associated incoming and outgoing agreements with the related inhouse project.

- The data will be inserted into each shell at the time of shell creation.
- If additional agreements are executed, they can be manually added by clicking the **Add** button. If there are no additional agreements to add, the message “*there are no more incoming/outgoing agreements to add*” will be displayed.
- If there are agreements that have terminated since shell creation, they can be manually deleted by clicking the **Delete** button.
- Use the “GoTo” Blue Arrow on each line to view the individual project in ARIS.

Oracle Fusion Middleware Forms Services

Agricultural Research Information System (ARIS) - Work 421

File Edit Action Record Forms Prints Help

ARIS Annual 421 Records

Proj 0202 11000 001 00 D Accn 0408191 Modecode 02 02 00 00 Reporting Year 2014

List Project Info Questions 1-3 Questions 4-7 Associated Agreements Publications Signatures

Outgoing Agreements

Project No.	Title	Cooperator
0202-11000-001-34M	MOU BETWEEN THE FOREST SERVICE AND	USDA, FOREST SERVICE
0202-11000-001-42G	CARBON SEQUESTRATION AND GREENHOUSE	COUNCIL FOR AGRIC SCI & TECH
0202-11000-001-43N	DEVELOP THE FEEDSTOCK READINESS TOOL	FEDERAL AVIATION ADMIN
0202-11000-001-44M	COOPERATIVE RESEARCH AT THE REGIONAL	USDA, FOREST SERVICE
0202-11000-001-46G	SPONSORSHIP OF ECOLOGICAL SITE DESCI	SOCIETY FOR RANGE MGMT

Add Delete

Incoming Agreements

Project/Log No.	Title	Cooperator
0000044326	CONSERVATION EFFECTS ASSESSMENT PRO.	NATURAL RESOURCES CONSERVATION
0000044330	CEAP - WETLANDS MID-ATLANTIC REGION	NATURAL RESOURCES CONSERVATION
0000044374	CONSERVATION EFFECTS ASSESSMENT PRO.	NATURAL RESOURCES CONSERVATION
0000044377	CONSERVATION EFFECTS ASSESSMENT PRO.	NATURAL RESOURCES CONSERVATION
0000045859	CONSERVATION EFFECTS ASSESSMENT PRO.	NATURAL RESOURCES CONSERVATION

Add Delete

Record: 1/2 <OSC>

Fig. 13e – Associated Agreements

Publications:

- Select the **Publications** tab to view the Publication List screen (fig. 14a).
- All publications that meet the requirements for entry on the annual report will be automatically propagated by the system (publication date within the FY).
- Each publication should be reviewed for accuracy and additional publications added as needed.
- To add additional publications, click the **Add Publication** button to display the Publication Details screen (fig. 14b).

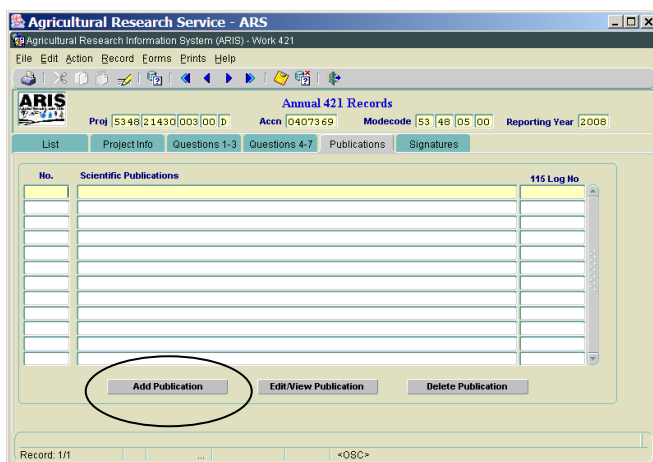


Fig. 14a – Publications Screen

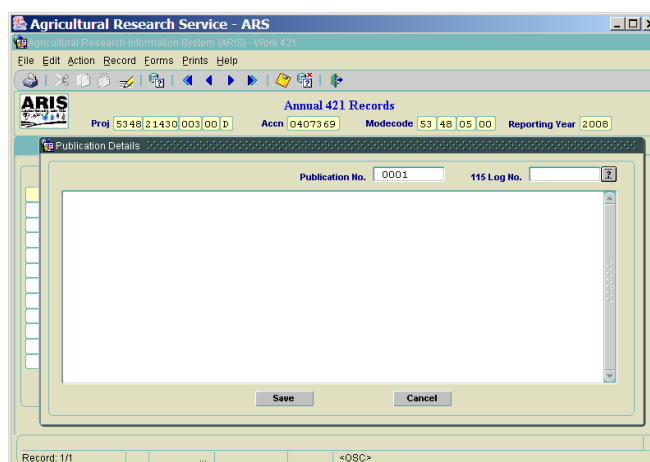


Fig. 14b – Publications Details Screen

- Publication No. will be automatically generated.
- Click the "?" next to the 115 Log number field to display the 115 Log Number Reference screen (fig. 14c).
- Search for the 115 by entering the log number with "%" before and after the number (e.g., %198723%) on the **Find** line.
- Click **Find** and **OK** (fig. 14c and 14d). The system enters the log number, as well as the citation information (fig. 14e).
- Click **Save** to return to the Publication screen where the publication is now listed (fig. 14f).

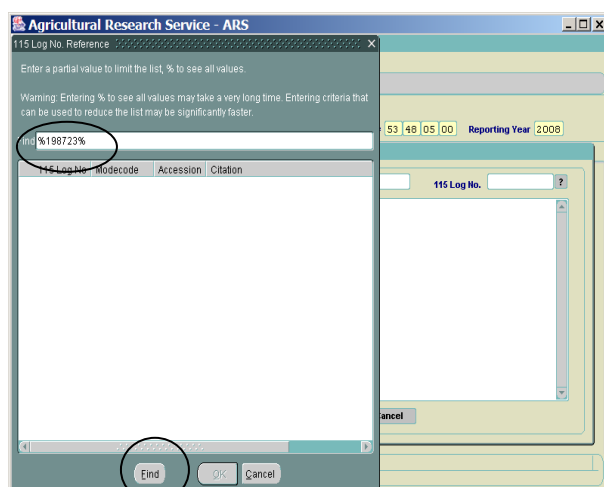


Fig. 14c – Log No. Reference Screen

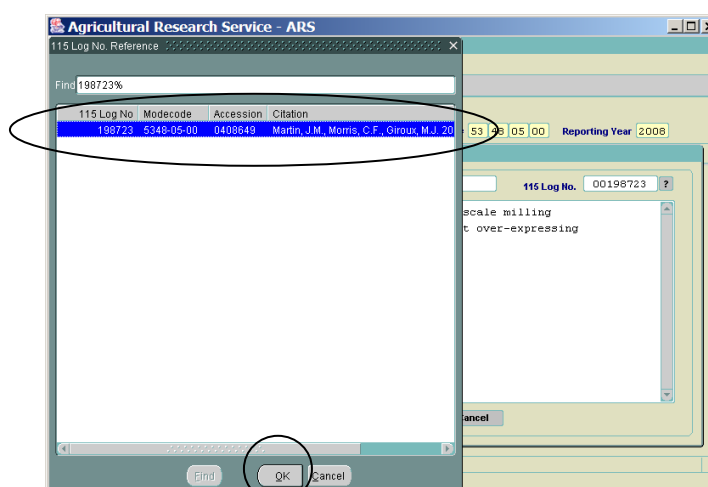


Fig. 14d - Log No. Query and Selection

Agricultural Research Information System (ARIS) - Work 421

File Edit Action Record Forms Prints Help

ARIS

Annual 421 Records

Proj 5348 21430 003 00 D Accn 0407369 Modecode 53 48 05 00 Reporting Year 2008

Publication Details

Publication No. 0001 115 Log No. 00198723

Martin, J.M., Morris, C.F., Giroux, M.J. 2007. Pilot scale milling characteristics of transgenic isolines of a hard wheat over-expressing puroindolines. Crop Sci. 47(2):1-10.

Save Cancel

Record: 1/1 <OSC>

Fig. 14e – Citation Entry from ARS-115

[illegible]

Fig. 14f – Completed Publication List

NOTE: Publications may be listed on multiple projects within the management unit, IF the research specifically relates to that project and associated scientists have contributed to the publication.

Note: Citations cannot be modified on the 421. Therefore, if incorrect, the data will need to be corrected by creating a Work 115 record and modifying as necessary. Once modified, the changes will automatically be propagated to the 421.

- To delete a publication, highlight the publication and click the **Delete** button.
- Publications will be automatically renumbered after any deletions.
- Continue adding all the publications.
- Once complete, click the **List** tab to return to the List screen.

Data entry of the 421 Annual Report is now complete.

Text Field Sizes

Question:	Maximum Size*:
Question 2: Milestones	1,000 characters per milestone; 500 characters per description
Question 3: Progress Report	10,000 characters
Question 4: Accomplishments	2,000 characters each/ maximum of 99 accomplishments per project
Question 5: Target Population	Unlimited
Question 6: Technology Transfer	2,000 per description field
Question 7: International Cooperation	1,000 characters per description field
Publications	1,500 characters per citation

***NOTE:** All character counts include spaces and punctuation.

Modifying 421s

To modify a 421 Annual Report before approving, highlight the 421 from the List screen, then click the tab (Project Info, Questions 1-3, Questions 4-7, Associated Agreements, or Publications) and modify the text. When modified, click the **Save** button.

If an entire response is incorrect, use the **Clear** button at the bottom of the Response page to clear the entire response. Then, add the new response. Once modifications are complete, print and/or approve the 421.

Note: If the entire 421 needs replacement, click the **Upload Responses** button and enter the revised MS Word file. The new file will overwrite the responses currently in ARIS for Questions 3, 4, and 5. Questions 1a, 1b, 2, 6, 7 and publications will not be impacted by the reload. Modify these online as necessary.

Printing Listing of 421 Shells

To print a list of 421 shells in your Work file:

- Go to your Work file List screen.
- Click **Mark All**, **Print**, and **Summary** or **Summary w/o Title**.
- Adobe will display the print file. Click the printer icon to print.
- The Summary listing includes the project number, accession number, mode code, title, start date, and termination date.
- The Summary w/o Title will include all of the above without the title.
- You can print a list of all Active projects and compare the two lists for accuracy. Some projects may have become Active after the initial creation of the Annual Report shells and may need to have shells added. Please contact your Area Program Analyst to have shells added (or deleted).

Printing Templates

To print a template in “Word” for an AD-421:

- Mark the record.
- Click **Prints** and **Template/Extract to Word**.
- This feature will create a Word document that can be saved and/or emailed to the scientist to fill in and return to the ARIS support for data entry. (See pg. 25 for more information on Extract to Word.)

Printing 421s from Work File

- Mark the project(s) to be printed on the List screen.
- Click **Prints** and **AD-421**.
- Adobe launches and displays the print file.
- To print the file, click the printer icon, and press **Enter**.

Approving 421s

To approve a 421:

- From the List screen, highlight the 421 to be approved and click the **Signatures** tab.
- The Signature screen will be displayed (fig. 15a).
- Enter the signature on the appropriate line, enter the approval date, and check the approved box. (**Note:** AD level requires a password upon approval.)

To add signature remarks (optional):

- Click the notepad icon next to the appropriate signature line (fig. 15a).
- Add remarks as appropriate and click **Save** (fig. 15b).
- If remarks have been added, the check box will be automatically filled in to indicate remarks have been added.
- Click the **List** tab. ARIS will prompt you to save. Click **Yes** and ARIS will return to the List screen. The approved 421 will move immediately to the next approval level.

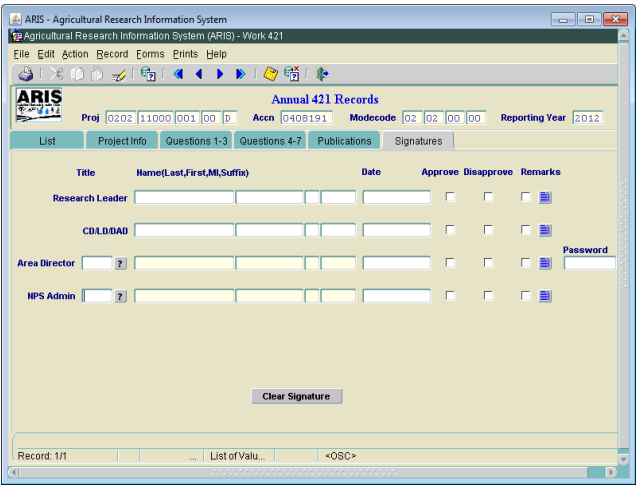


Fig. 15a – Signature Screen

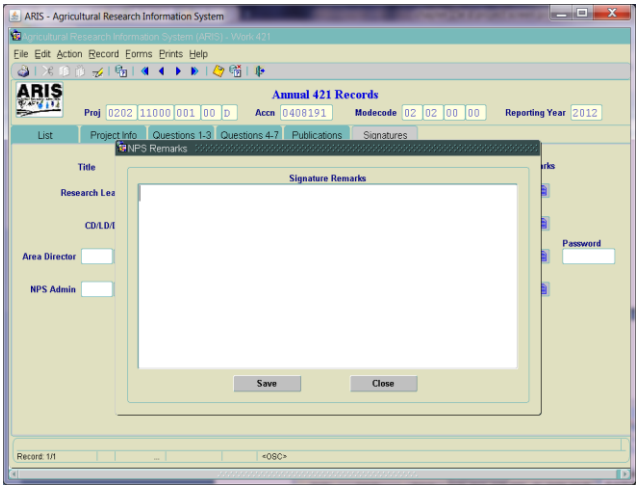


Fig. 15b – Signature Remarks

Printing 421s from Active File

ARIS provides multiple options for printing an AD-421. The best option is from the **Active** file as it allows printing AD-421s across multiple years. The other locations in ARIS to print 421s only allow printing the most recent FY AD-421.

To print a 421:

- Click **Active** and **421** from the Research Documentation screen to open a query screen (fig. 16).
- Enter the query criteria, e.g., NP 103, “D”, FY 2014.
- Click **Execute Query** on the Tool bar to display a list of projects meeting the query criteria (fig. 17).

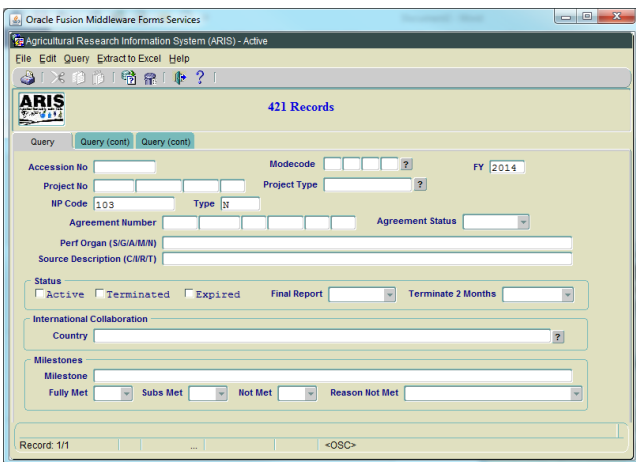


Fig. 16 - Active 421 Query Screen

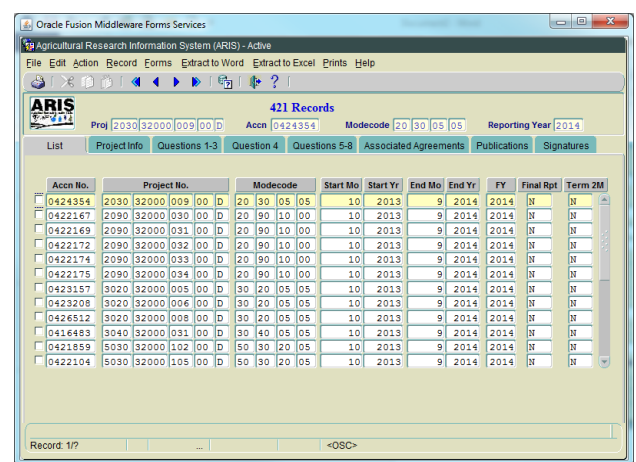


Fig. 17 – Query Results List Screen

To print all records, click **Action** and **Mark All Records**.

- Click **Prints** and **Print AD421**.
- Select the appropriate print option(s) (fig. 18) to open Adobe and display the print file (fig. 19).
- **Note:** When printing large reports, it is best to split the print job into smaller segments.

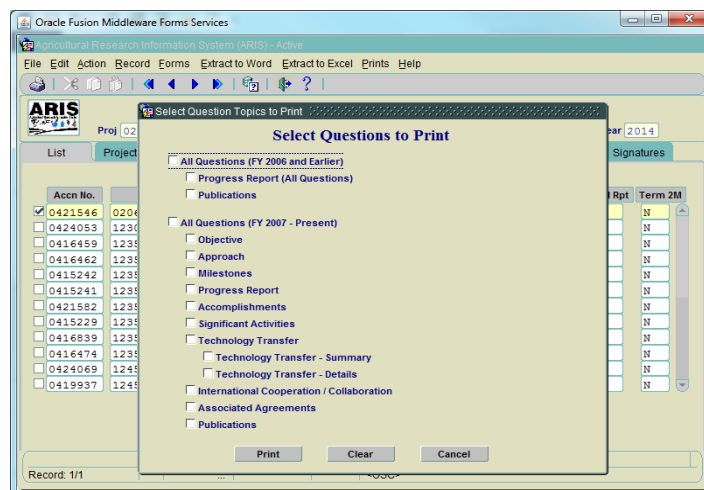


Fig. 18 – Print Options

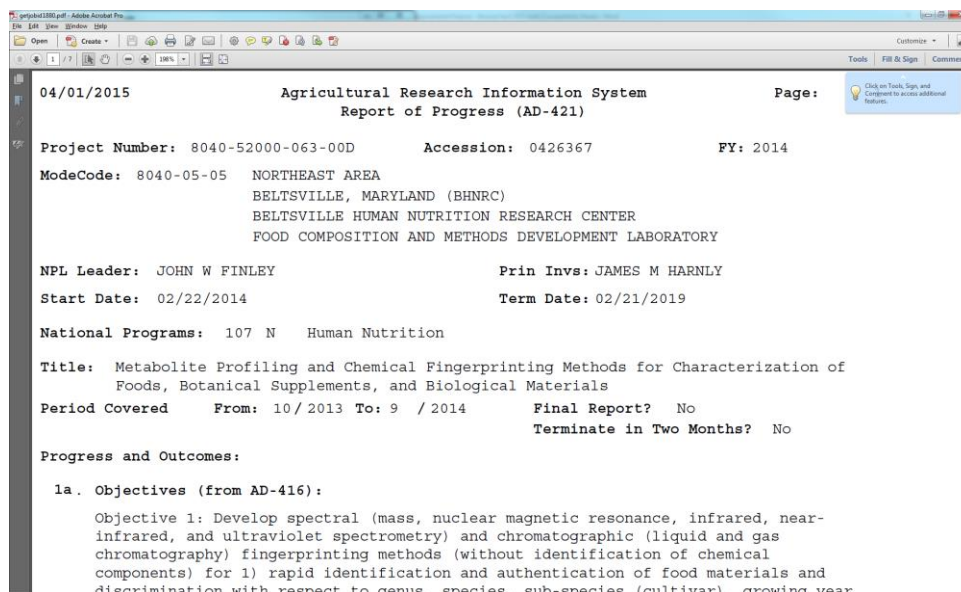


Fig. 19 – Adobe Print File

Extract to Word from Active File

The **Extract to Word** option converts the ARIS AD-421 data to a Word file.

- Click **Prints** and **Extract to Word** from the Menu bar.
- Click the option required (fig. 20) and ARIS opens MS Word, displays the AD-421 file, and minimizes the Word window.
- To print, restore the Word window and click the printer icon on the Word Tool bar (fig. 21).

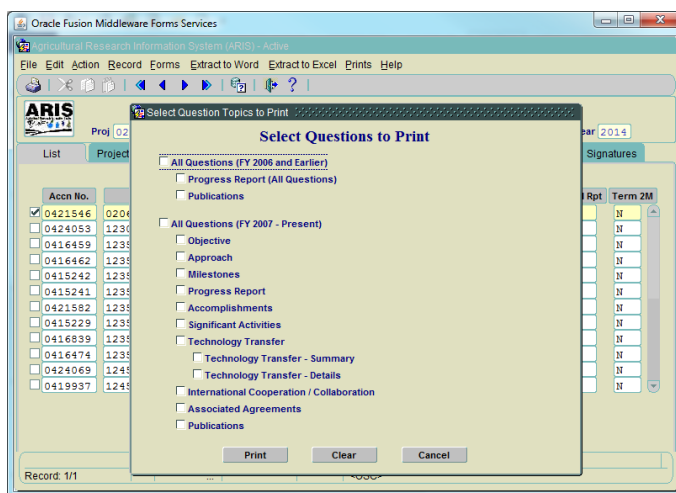


Fig. 20 – Extract to Word Options

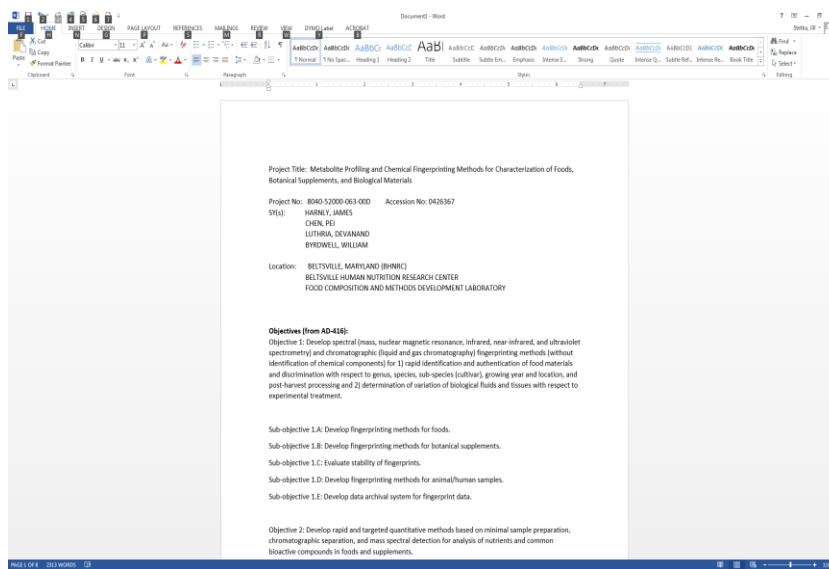


Fig. 21 - Annual Report Extracted to Word

- After minimizing the Word window, ARIS displays a “SaveAs” dialogue box (fig. 22).
- Change the file name and directory and click **Save** (fig. 23). This file can be later retrieved, modified, printed, etc., as needed.

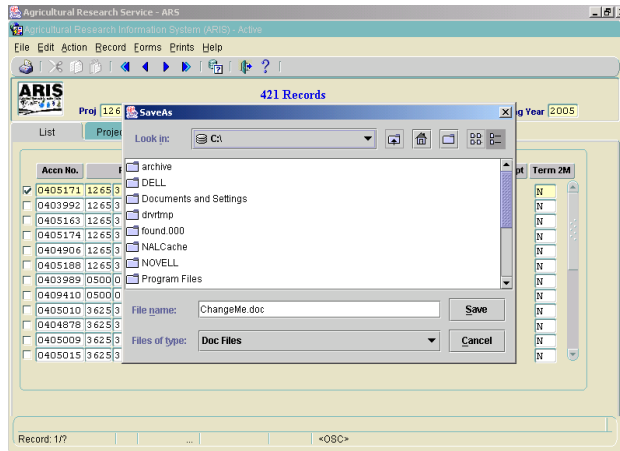


Fig. 22 - SaveAs Dialogue Box

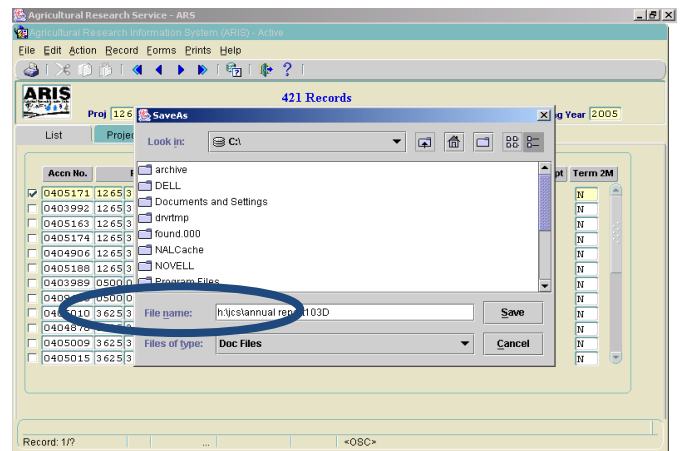
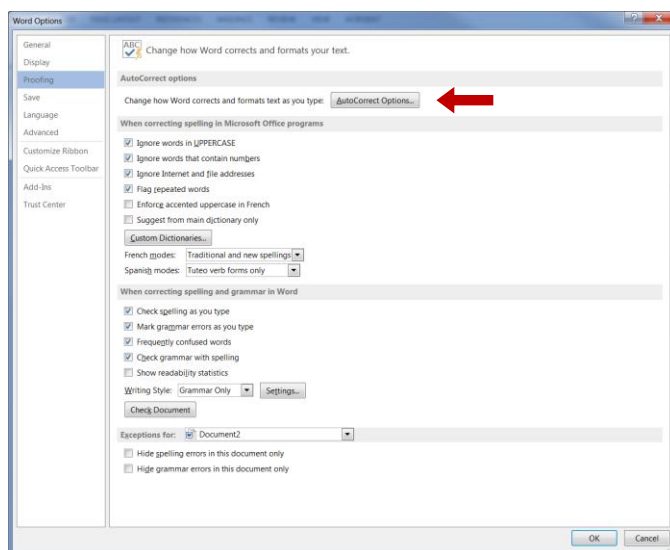


Fig. 23 - Changed File Name and Location

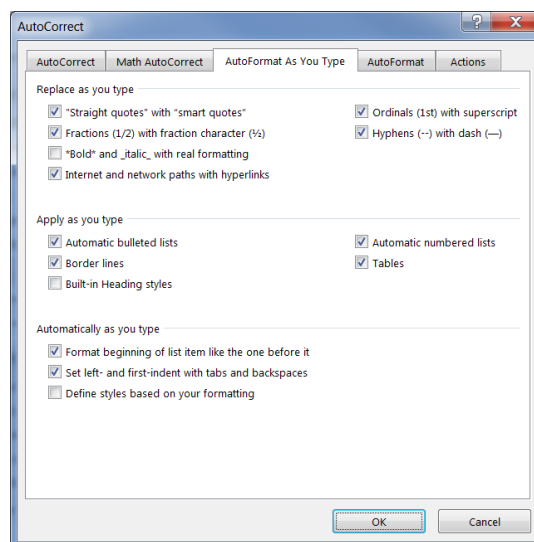
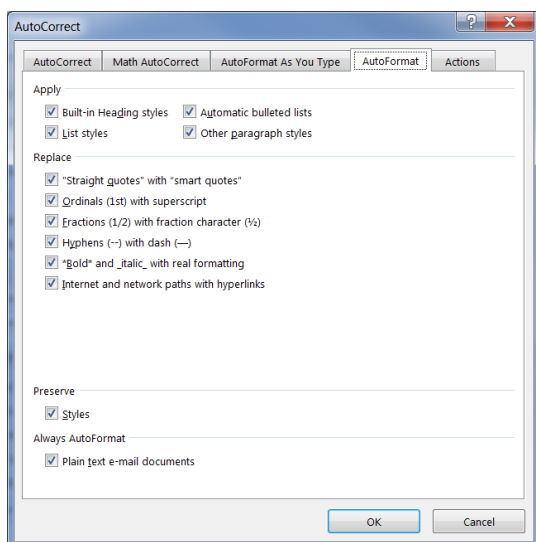
Appendix A

Turning Off AutoFormat for Bullets, Lists, and Smart Quotes

To turn off the AutoFormat feature in Word click the **File** tab in the upper left corner of the screen-> select **Options** -> **Proofing** in the left pane. This will display the **Options** dialogue box. Click AutoCorrect Options.



From the AutoCorrect dialogue box, uncheck **Automatic bulleted lists**, **List styles** and **Straight quotes with smart quotes** in both the **AutoFormat** and **AutoFormat As You Type** tabs.



Appendix B

Guidance for Completing Annual Report Questions

1. Background (automatically populated)

- **1a. Objectives:** Verbatim extract from the AD-416. No changes can be made to the objectives within the AD-421.
- **1b. Approach:** Verbatim extract from the AD-416. No changes can be made to the approach with in the AD-421.

2. Milestones for FY 2015 *(This section will not be posted on the web).*

- List currently approved Milestones that were to be addressed in FY 2015.
- Choose the status of each Milestone from the List of Values (LOV) provided. If “Milestone Not Met” is chosen, a reason must also be chosen from the LOV provided.
- If no Milestones were to be addressed in the FY, check the box “No Milestones for FY” and provide a brief explanation.

Status Options:

- Milestone Not Met
- Milestone Substantially Met
- Milestone Fully Met

If “Milestone Not Met” is chosen, select one reason from the following:

- Critical vacancy
- Insufficient resources (lack of operational funds)
- Redirection (by Office of National Programs)
- No longer applies (Milestone no longer applicable)
- Other (a reason for not meeting the Milestone other than the options above); if “other” is chosen, a brief description of why should be provided.

Optional: Add a one- or two-sentence explanation for the status of a Milestone in the space provided (**do not put the explanation with the actual milestone**). It should be entered in the separate field provided (500 characters max).

3. Progress Report:

- Within the text, it should indicate how progress relates to the objectives of the project.
- Describe what was done during the year, regardless of whether or not the work has a significant accomplishment to report.
- **If the project is terminating during the annual report cycle, Question 3 should be written as such and briefly summarize the life of the project.**
- **If significant progress has been made on subordinate project(s), describe as necessary as it relates to the in-house project objectives.**
- **Avoid use of technical jargon, acronyms, CRADA partner names, and scientists’ names.**

4. Accomplishments:

List the **significant** research accomplishments in order of importance during FY 2015. (Not all projects are expected to have a significant accomplishment each year.)

- Definition: An accomplishment is a completed scientific effort that can be expected to have scientific or technical impact.
- Each accomplishment should be described in a single paragraph, the meaning of which can stand on its own.
- The accomplishment should be written in a concise four- to six-sentence paragraph, addressing each of the following:
 - Short title;
 - Description of the problem or question investigated;
 - Description of what was accomplished;
 - Description of the actual or potential impact on solving significant problems facing U.S. agriculture.
 - Note: It is helpful to state “ARS Researchers at (city, state)”.....in the text of the accomplishment.
 - The accomplishment should be written in a flowing paragraph. DO NOT use actual “labels” for each of the sentences (e.g. “Description:”, “Impact:”)
- The National Program, Component, and Problem Statement (NP/C/PS) should not be written into the text of the Accomplishment(s). A List of Values (LOV) will be provided in ARIS to select the NP/C/PS(s). (see ARIS Handbook for more detailed information).
- **Major accomplishments of the subordinate research projects (accomplishments at the level where they are candidates for inclusion in the National Program Annual Report, budget documents, and/or Government Performance and Results Act (GPRA) reports) should be captured and reported in the parent research project’s AD-421, with credit as appropriate.**
- **Avoid use of technical jargon, acronyms, CRADA partner names, and scientists’ names.**
- Accomplishments should be written to speak to educated lay persons who have an interest in agriculture. **The audience for your report may vary from Congressional staff to farmers to students, none of whom is likely to be interested in the technical details of the project. Do not** mention names or provide details such as the location of select agents and radioisotopes that might elicit the interest of nefarious parties. In rare instances, you may need to be circumspect to protect intellectual property. In those cases, please consult the Office of Technology Transfer to determine how to report such an accomplishment.
- **See Appendix C for examples of Accomplishments.**

5. Significant activities that support special target populations. *(This section will not be posted to the web)*

- Enter information only if you have specific activities or special outreach efforts that directly benefit USDA target populations (small farms--defined as under \$250,000 annual gross receipts--or “socially disadvantaged/limited resource/historically under-served” producers).
- If there are no activities to report here, simply state “**none.**”

6. Technology Transfer *(This section will not be posted to the Web)*

(See the ARIS Online Handbook for a detailed explanation on how to enter the information for each of these categories.)

The system will automatically propagate much of the data based on the in-house project number the items are associated with. An additional field is provided for each item and must be completed with detailed information for each of the technologies listed. The detailed information answers: What is the technology, How was it transferred, Who are the customers/Users, and What is the demonstrated or anticipated impact and/or outcomes.

Technology transfer categories listed in this section includes:

- Number of New CRADAs
- Number of Active CRADAs (does not include the new CRADAs)
- Number of New/Active MTAs (outgoing/giving only)
- Number of New Invention Disclosures Submitted
- Number of New Patent Applications Filed
- Number of New Germplasm Releases
- Number of New Commercial Licenses Executed
- Number of Web Sites Managed
- Other Technology Transfer

7. International Cooperation/Collaboration *(This section will not be posted to the Web)*

- Does the project have any international cooperation/collaboration? If yes, then the country the collaboration is with should be listed as well as agreement number if the collaboration is associated with an “official” agreement.
- Provide a description of the collaboration/cooperation, including the name of the international institution and a brief description of the research and the overall objectives of the activity.
- Additional information that should be provided includes: if funded, who is funding the activity, even if informal.
- If there is no “formal” agreement in place, but there is international cooperation/collaboration, then only the description field should be completed.
- Information should be entered in complete sentences.
- **Scientists’ names should NOT be listed.**

Associated (Subordinate) Agreements:

All active agreements that are associated with the in-house project will be automatically propagated into the annual report on the Associated Agreements tab. Additional agreements can be manually entered as appropriate. No action or other data entry will be required.

Publications:

Publications that meet the criteria stated below will be automatically propagated into the annual report. Additional publications can be entered as appropriate.

- **Only peer-reviewed publications in scientific journals (no proceedings), review articles that are related to the subject of the project, book or book chapters related to the subject of the project, Germplasm Registration Articles, and Natural Resources Research Updates (NRRU) can be listed here.**
- Enter only the publications published in print or electronically during FY 2015 ([include publications from subordinate projects that include an ARS author](#)).
- Prior year publications can be listed, if applicable to the research, and have not been entered on previous annual reports. Do not list articles that are “in press.”
- There must be an approved ARS-115 Manuscript Approval for each publication. The citation information from the ARS-115 will propagate to the AD-421 when the ARS-115 Log Number is chosen.
- **Publications automatically propagate into the Annual Report for the project in which the ARS-115 is entered under. If a publication relates to more than one project within the management unit, it may be listed on additional projects as long as the research in the publication directly relates to that project and there has been significant contributions to the publication.**

Appendix C

FY2015 Annual Report (AD-421) Additional Guidance and Examples

Compiled below are some examples of good responses to the individual annual report questions, in addition to responses to some frequently asked questions and additional guidance.

Please NOTE: It is never one size fits all. Research projects differ in scope, content and performance; therefore, responses may need to be handled in different ways. The examples below are to give some general guidelines to follow and show some good responses to use as a guide.

Question 2: Milestones

1. **When old project expired early in the fiscal year and new project was established. No milestones were being addressed on the old project:**

- Check the box “No Milestones for FY” and enter an explanation, such as:

“No Milestones were to be addressed in FY2014. Milestones were incorporated into the new in-house Project No. 0206-11000-005-00D”

Note: It is good to give a connection from the old project to the new project.

2. **Good response to reason why Milestone Not Met (Other):**

“Collaborations with ARS scientists in Beltsville, Maryland have been re-established to continue our 2014 experiments with ongoing insect work with inbred and hybrid lines of corn. This project has more relevance now since we now know the identity of the fungal inhibitor (surfactin), which is also considered toxic to insects.”

3. **Good response for reason why Milestone Not Met (No longer applies):**

“The extramural project for incorporating the decision algorithms of WeedSite into a farm recordkeeping program was modified this year to address a more urgent need of corn growers in Colorado. The new objective is to develop a decision model to help crop consultants and growers select the time and amount for irrigations when allocating a limited supply of water among corn fields on a farm.”

Question 3: Progress Report

1. **Good summary for life of project and explanation of termination:**

This is the final report for the project 6222-21220-002-00D terminated in January 2009. There was a period between the beginning of FY2009 and the termination date for the project occurring in fall and winter. All planned field experiments were completed prior to the start of FY2009; no experiments were initiated in the timeframe corresponding to this project.

Substantial results were realized over the 5 years of the project. An organic production system was developed for transplants, with results equivalent to those produced with conventional methods and materials. Addition of bacteria to potting media beneficially affected transplant production. When similarly treated seedlings were moved to the field, effects in the greenhouse did not carry over. In the transition to organic production, multiple crops and inputs were studied and it was determined that production during the transition period is costly but yields increased over time. Inoculation with microbes was not beneficial to plant development and yield in peanut and vegetable crops following peanut. Cropping with early maturing ryegrass could be followed by two additional vegetable crops, with sufficient time to reestablish the cover crop. Greenhouse-grown onion transplants can be established in the field. Yield increased as onion plant density increased; additional fertilizer was not needed. Early harvested onion had more nutrients in bulbs. It is not necessary to apply manure every year in production of organic vegetables. Corn gluten meal can be applied to spring-transplanted onions and non-pungent jalapenos, providing good to excellent early weed control. The synthetic herbicide pendimethalin provided superior weed control and crop yields compared to corn gluten meal. Corn gluten meal can be safely band-applied for weed control to direct-seeded organically grown vegetables. Phytotoxicity, application rates, and incorporation methods of corn gluten meal for direct-seeded cucurbits and beans were determined. The impact of the research was that production systems were designed to give producers flexibility in determining levels of inputs to use to maximize efficiency. Additional impact was that organic post-emergence weed control strategies were developed for early-season weed control; integrated systems need to be developed for season-long control. The application technology can be used with other powdered or granulated materials in organic production. The overall impact of the accomplishments is that producers have new information on which to make decisions concerning production systems to maximize profits while sustaining yield.

Note: This response gave an explanation of the termination as well as a summary of progress for the life of the project. It would have been helpful to give the connection to the replacement project.

2. Good precise summary which relates back to objectives and problem statements:

Progress was made on all four objectives and their subobjectives, all of which fall under National Program 215, Component I, Rangeland Management Systems to Enhance the Environment and Economic Viability. Progress on this project focuses on Problem A, the need for economically viable rangeland management practices, germplasm, technologies, and strategies to conserve and enhance rangeland ecosystems, and Problem B, the need for improved rangeland production systems for rangelands that provide and use forages in ways that are economically viable and enhance the environment. **Under Objective A.1**, we made significant progress in developing management and monitoring strategies that conserve natural resources. These strategies were developed for arid and semi-arid rangelands in North America and Asia. State and transition models, ground-based indicators, and remote sensing technologies were developed and tested as a suite of monitoring technologies for a broad range of spatial and temporal scales. **These technologies also address Objective B.1**, to develop monitoring tools and management strategies for managers, because they are being adopted by other federal agencies, such as the BLM, in monitoring rangeland status and change. Under Objective A.3, we made significant progress in identifying factors that can be used to predict and minimize rangeland degradation. We made progress toward demonstrating the role of endophytes in stomatal function in plants that can be used to improve revegetation success, with special emphasis on restoring degraded arid grasslands in the southwestern US. Progress was also made in determining the role of landscape context and

connections among spatial units in limiting remediation success. Progress was made in identifying new methods to modify the spatial distribution of water, with influences on the spatial pattern in plant establishment. Under Objective B.4, we made significant progress in assessing animal productivity under alternative management strategies. Progress was made toward determining the effects of supplementation on palatability of juniper to livestock. Progress was also made in determining market potential for aridland-adapted cattle (Criollo) compared to European breeds. Progress was also made in testing inexpensive sensors to gather cattle into corrals using directional virtual fencing technology.

3. Good relation to objectives:

“Progress was made on all three objectives, which fall under NP301. Under Objective 1A, 14 crosses were made.....Under Objective 1B, significant progress was made towards identifying....etc.”

“Research was completed on project objectives related to the safety of aquaculture products. These objectives related to the safety of shellfish, which contribute to bacterial and viral illnesses among shellfish consumers. Completed objectives included the development and evaluation of a novel enzyme....”

“Progress was made in both objectives all of which fall under National Program 301, Component 1, Crop Genetic and Genomic Resources and Information Management. Activities on this service project focus on Problem 2B, Plant and Microbial Genetic Resource and Information management.

In regard to Objective 1, this past year eighty-one loans were sent nationally and internationally with an equal number returned. An emphasis was placed on obtaining the return of loans that were more than five years overdue. About 14,000 new specimens were accessioned that document research throughout the world. An increasing number of requests for specimens on loan include the desire to destructively sample specimens to obtain DNA. Personnel at the US National Fungus Collections have been revising policies and discussing these issues. We desire to support this research while protecting specimens for methods available in the coming centuries. These activities contribute to fulfillment of objective 1 of this service project as stated in the plan to curate specimens in the U.S. National Fungus Collections as an international reference resource for use by scientists throughout the world. A number of tours were given to in-house personnel as well as visiting scientists.

In regard to Objective 2 concerning the development of on-line resources about the systematics of fungi, especially plant pathogens of importance to scientists and plant quarantine officials, about 50,000 new fungus-host reports were added to the worldwide database of fungi on plants around the world for a total of over 900,000 reports. This represents the most comprehensive database of fungi on plants in existence. The 300,000 card file reporting fungi on plant hosts was scanned and an application developed that allows these reports to be edited and included in the fungus-host reports.”

4. Good general summary for the year:

In 2014, we conducted monitoring and forecasting for stripe rust and provided disease updates to growers in the Pacific Northwest (PNW). Through cooperators in other states, stripe rusts of wheat and barley were monitored throughout the US. As a result of our disease monitoring, accurate forecasting, timely alerts, and advices for disease management, wheat growers appropriately applied fungicides to reduce yield losses. New models were developed to forecast potential stripe rust damage for the PNW and data analyses were finished to determine stripe rust over-wintering and over-summering regions in the US.

We completed testing of 331 stripe rust samples obtained from 20 states in 2013 and we have finished about 50% of more than 300 samples in 2014 to identify races. From the 2013 samples, we identified 11 barley stripe rust races and 33 wheat stripe rust races, of which one new race was identified for each of the stripe rust forms. The information on predominant races is essential to breeding for resistance and disease management.

To support breeding programs in the US, we tested more than 20,000 wheat and barley entries for stripe rust resistance. The data were provided to breeders for developing resistant cultivars and to growers for choosing resistant cultivars to grow. Growing resistant cultivars in the majority of wheat fields prevented the potentially more than 20% yield losses in the PNW and other regions, which saved growers millions of dollars. Through our intensive testing, cultivars with adequate resistance to stripe rust have been developed. In 2009, we cooperated on the pre-release, final release, and registration of 16 wheat cultivars possessing stripe rust resistance with breeding programs in various states.

To identify new genes for stripe rust resistance and develop molecular markers, we completed studies of identifying and mapping two new genes from world wheat germplasms 'PI181434' and 'PI480148' for effective resistance. We made progress on our genetic and molecular mapping studies, and developed new wheat germplasms with high level and durable high-temperature adult-plant (HTAP) resistance to stripe rust through marker-assisted pyramiding of genes previously identified from wheat cultivars 'Alpowa' and 'Express'.

To understand molecular mechanisms of stripe rust resistance, we completed studies to identify unique and common defense genes and their biochemical pathways regulated by various stripe rust resistance genes using a custom wheat genechip. We obtained good molecular data to answer the questions why non-race specific HTAP resistance is durable and the other type of resistance is not durable. In cooperation with scientists in UC Davis and other ARS programs, we cloned the Yr36 gene and published the results in Science.

We evaluated 15 fungicide treatments to control stripe rust. Better chemicals were identified. We also determined potential yield losses of 24 winter wheat cultivars popular in the PNW and their responses to fungicide. These results are useful for registering new fungicides and for growers to choose best fungicides when needed.

4. Good general summary for the year:

We studied native, naturalized, and domesticated stocks of Pacific oysters using AFLP markers and found that although historical accounts say this species was introduced from the Myagi region, domesticated stocks derived from naturalized populations are related to native populations from the Midori/Hiroshima region. This could be the result of domestication selection.

We studied the genetic structure of remnant populations of the Olympia oyster using previously developed molecular genetic markers and demonstrated: 1) regional-scale genetic differentiation among estuary systems and among localities within Puget Sound and SF Bay 2) that re-established populations in Coos Bay are derived from Willapa Bay, and 3) that previous re-stocking efforts can impact the genetic composition of populations through the use on non-local broodstock and bottleneck effects.

In collaboration with the Molluscan Broodstock Program, we deployed for testing and evaluation, second-generation families of novel Kumamoto oyster germplasm collected from the Ariake Sea in 2006 as part of a joint ARS, University of Southern California, and industry effort to replace and/or revitalize existing contaminated and inbred germplasm.

As part of a coordinated effort to address catastrophic mortality in commercial oyster hatcheries, we are conducting mixed-family screening experiments to identify strains that can resist or tolerate the conditions causing them. The trials consist of raising over 100 genetic families under commercial conditions and using parentage analysis to assign survivors to their parents

We initiated collaborative research with the Molluscan Broodstock Program to estimate the genetic (co)variances for larval and post-larval traits with the goal of using this information to incorporate larval survival as a breeding objective without undesirable correlated responses. Developing this project was complicated by ARS' dependence on MBP's hatchery capabilities and MBP's resistance to embracing modern molecular methods.

We collaborated with MBP on a project to estimate the heritability of shell coloration in Pacific oysters. This trait is becoming increasingly important as oyster markets shift away from shucked meats toward the more lucrative half shell trade.

Our use of molecular marker-based parentage analysis to address larval mortality issues is, to my knowledge, the first application of this technology in a shellfish breeding program, and as such constitutes an important "proof of concept" step toward using mixed-family selection for genetic improvement in molluscan shellfish.

We completed laboratory studies comparing gene expression patterns in heat stressed or bacterially challenged oysters from stress-sensitive and stress tolerant families and are currently testing for correlations between expression levels of stress tolerance genes and growth and survival in the field and to map the regulatory regions that determine these expression levels.

We have completed phenotypic-level work and begun genotyping samples from a large QTL mapping experiment to identify genomic regions associated with growth and survival in the field.

5. Good opening paragraphs to show continuation from old projects:

"This report documents progress for the parent Project 6612-61660-002-00D Improving Crop and Animal Production Systems for Southern Producers which started Oct 2008 and continues research from Project 6612-61660-001-00D Developing Sustainable Crop and Animal Production Systems Suitable for the Southeast."

"This report documents progress for Project Number 5348-11000-006-00D, which started in March 2010 and continues research from Project Number 5348-1100-005-00D, entitled "Quantifying and Predicting Emission of PM10 and Greenhouse Gases from Agricultural Soils."

"This report is for this new project which began September 2013, and continues research from 5354-21660-002-00D, "Sustainable Cropping Systems for Irrigated Specialty Crops and Biofuels". As this new project just began, there is no significant progress to report in FY13. Please see the report for 5354-21660-002-00D for more information.

6. Good connection to new project:

"This project was terminated on December 14, 2008 and replaced with project 5306-21000-019-00D. Details of progress on milestones relating to improving postharvest life of potted plants and cut flowers through the use of molecular and applied technologies research can be found in the 2009 Annual Report for 5306-21000-019-00D."

7. Good completion statement and connection to new project:

“This is the final report for Project 5450-51000-041-00D, which has been replaced by new Project 5450-51000-047-00D. For additional information, see the new project report.

General Comments:

NOTE: The responses in Question 3 should give a summary of progress for the **YEAR**, not the life of the project, unless the project is terminating, in which case a summary of the life of the project is required.

NOTE: This question gives the users of the report an idea of how the project is going, what objectives are being met or not met in that year, and what is next. It is not to give the accomplishments, which should be indicated in Question 4.

Question 4: Significant Accomplishments: (See Additional document on accomplishments used in 2011 Explanatory Notes)
General comments:

- Accomplishments are for “selling” the importance of our research to our “customers”.
- Accomplishments should point to economic value, value to industry/customers or to current administrative priorities.
- Accomplishments MUST have an outcome/impact statement.
- Many accomplishments are written too scientifically. They need to be written in terms for the general public to understand.
- Accomplishments should be reflective of the objectives on the project.

1. Examples of accomplishments that have too much experimental data or too technical:

“Toxoplasma gondii isolates from free-range chickens from the northeast region of Brazil. The prevalence of Toxoplasma gondii in free-ranging chickens is a good indicator of the prevalence of T. gondii oocysts in the soil because chickens feed from the ground. The prevalence of T. gondii in 152 free-range chickens (Gallus domesticus) from 22 municipalities in 7 northeastern states (Pernambuco, Rio Grande do Norte, Maranhão, Bahia, Ceará, Sergipe, and Alagoas) of Brazil was determined. Antibodies to T. gondii were assayed by the modified agglutination test (MAT); 81 (53.3 %) chickens had titers of 1:5 in 26, 1:10 in 9, 1:20 in 4, 1: 40 in 1, 1: 80 in 6, 1: 160 in 6, 1:320 in 13, 1: 640 in 6, 1:1,280 in 3, 1:2,560 in 6, and 1:5,120 or higher in 1. Hearts and brains of 81 seropositive chickens were bioassayed individually in mice. Toxoplasma gondii was isolated from 23 chickens with MAT titers of 1:5 or higher; the isolates were designated TgCKBr165-187. Five isolates killed all infected mice. Results indicate widespread contamination of rural environment in Brazil with T. gondii oocysts. This work relates to NP 108 Action Plan Component 1a, Pathogens, Toxins, and Chemical Contaminants Preharvest, ii, Epidemiology, to determine the origin and routes of transmission of epizootic pathogens.”

“Efficacy-dependent actions of piperidine alkaloid teratogens and enantiomers. Lupines and other plants such as Conium maculatum L., Nicotiana glauca and Nicotiana tabacum contain toxic and teratogenic piperidine alkaloids in mixtures of enantiomers. Although, the enantiomers have the same physical properties the enantiomers have different physiological properties. A pharmacodynamic comparison of the alkaloids anabesine, anabaseine, anagrine, ammodendrine, and coniine in two cell lines was made. These alkaloids and their enantiomers were more effective in depolarizing TE-671 cells which express the human fetal-muscle

type nicotinic cholinergic receptor (nAChR) relative to SHSY-5Y cells which predominately express human autonomic nAChRs. The rank order of potency in TE-671 cells was: anabaseine > (+)-anabasine > (-)-anabasine > (±)-anabasine > anagyrine > (-)-coniine > (±)-coniine > (+)-coniine > (±)-ammodendrine > (+)-ammodendrine. The rank order potency in SHSY-5Y cells was: anabaseine > (+)-anabasine > (-)-coniine > (+)-coniine > (+)-ammodendrine > anagyrine > (-)-anabasine > (±)-coniine > (±)-anabasine > (-)-ammodendrine. These findings support the hypothesis that the mechanism behind the teratogenic potential of these compounds is the stimulation of muscle-type nAChR followed by desensitization and finally inhibition of fetal movement. This information provides a pharmacodynamic comparison of the alkaloids anabasine, anabaseine, anagyrine, ammodendrine, and coniine in cell lines demonstrated the difference in toxicity between enantiomers.”

2. Accomplishment is “ok”, but there is no impact statement:

“Cryptosporidium oocysts have been found inside plant stomata. Cryptosporidium is a human and animal parasite found in contaminated water. Fluorescently labeled Cryptosporidium oocysts were found using laser confocal microscopy near and inside plant stomata, the microscopic breathing holes of plants. Washing of contaminated spinach leaves did not remove oocysts protected within the stomata suggesting a potential food safety issue for fresh cut leafy vegetables.”

Impact statement that could be added to end of accomplishment: “Newly developed methods have helped identify potential parasites or protozoal contaminants of produce. These technologies will also help identify factors for contamination of produce. Contaminates of produce by water is of importance to food safety and public health.”

3. Well-Written Accomplishments:

Identification of *Campylobacter* flagellar capping protein as a potential vaccine candidate. Vaccination is a potential method to prevent and control foodborne pathogens. ARS researchers in Athens, Georgia, screened a number of recombinant *Campylobacter jejuni* proteins against sera from infected broilers and breeder chickens. The flagellar capping protein reacted strongly to the antibodies in the sera. This protein is highly homologous among *Campylobacter* species, making this a potential vaccine candidate to reduce infection in chickens.

Native Cedarwood oil is a highly effective repellent to several insect pests. The American native cedar tree-wood oil (cedarwood oil, CWO) is an effective repellent to several species of ants, houseflies, two cockroach species and a tick. In outdoor tests, several species of ants were repelled by smearing CWO on a pole leading to a sugar-water solution. Similarly, in laboratory tests, the problematic-invasive, imported red fire ants were repelled by CWO separating them from a food source. Black legged tick nymphs were killed by CWO, and over 90% of adult houseflies died after contact with CWO. The crude carbon dioxide-derived CWO extract did show some repellency towards both German and American cockroaches. ARS scientists in Peoria, Illinois, have developed the CWO extraction protocol and have demonstrated its great potential use as an insect control agent from a safe, natural, native, renewable and underutilized agricultural resource.

Conventionally bred sweet orange-like hybrid and new rootstocks with tolerance to citrus greening released. Citrus greening or huanglongbing (HLB) is the most serious threat to citrus production worldwide and has reduced Florida citrus production by 50 percent. No genetic protection has been available for U.S. citrus growers. However, in 2014 ARS researchers at Ft. Pierce, Florida, released a new hybrid sweet orange with high quality fruit that displays excellent tolerance to HLB disease. These trees have been propagated at a commercial nursery and will be placed in replicated plantings on six grower sites with other advanced sweet-

orange-like selections and industry standards in 2015. Also, nine new citrus rootstocks have been developed that display much higher sweet orange fruit productivity and tree health in field trials growing in areas severely affected by HLB, as compared with commercial standard rootstocks. These rootstocks have been entered into the Florida clean budwood program, and are being propagated for entry into large scale grower trials in 2015. Release of the tolerant hybrid and rootstocks offer a new option for citrus growers for production management in the presence of citrus greening.

New technology provides nematode resistance in potatoes. Potato cyst nematodes (PCNs) are devastating pests for the U.S. potato production valued at \$4 billion. Methods for effective control of PCNs are limited and often rely on toxic chemicals, so there is a major need to develop new methods to protect potatoes from these nematodes. ARS researchers at Ithaca, New York, have identified effector genes that are critical for nematode infection and then employed a plant-mediated RNAi technology to silence these nematode genes resulting in nematode-resistant potatoes. This technology (US patent nos.: US 8,569,571 B1 and US 8,575,427 B2) provides a valuable new tool for plant researchers to protect potato growers and the industry from nematode losses.

New soybean cultivar JTN-5110 has resistance to multiple pathogens. In the United States, combined yield losses in soybean caused by soybean cyst nematode (SCN) and damaging fungal diseases combined (charcoal rot, stem canker, sudden death syndrome and Frogeye leaf spot) are estimated to be nearly \$1 billion. Resistant cultivars have stabilized yield losses for SCN, but over time, nematode populations have overcome the resistance. ARS researchers at the Jackson, Tennessee, worksite developed and released a new soybean line, JTN-5110, with resistance to all these pathogens, combined with yields ranging from 62-66 bushels/acre. Growers have been anticipating a cultivar with these combined traits and are adopting the new release for more effective management of SCN. This release also is being used by soybean breeders as an excellent parent material in crosses to develop more desirable cultivars.

Enhanced protection of bee germplasm through improved freezing and preservation of honey bee sperm. A decline in the numbers of managed honey bee colonies worldwide as well as in the populations of many indigenous bee pollinators has created an urgent need for germplasm preservation methods for honey bees and solitary bees. ARS researchers in Fargo, North Dakota, in collaboration with researchers at North Dakota State University have developed a technique for the cryopreservation of honey bee sperm that yields 100 percent survival of the sperm after thawing. This technique will enable the conservation of not only honey bee genetic diversity, but also that of other bee pollinators, and will be used by customers and stakeholders in the honey bee and solitary bee industry to maintain genetic diversity and preserve species.

Post-harvest treatment of spotted wing drosophila flies protects export markets for small fruits and berries. Spotted wing drosophila (SWD) is a serious threat to the production and trade of economically-key specialty crops in the United States, including table grape, stone fruit, blueberry, sweet cherry, blackberry, raspberry, and strawberry. This insect is regulated as a quarantine pest in certain countries that import fresh fruits from the United States and specifically, California. ARS researchers at Parlier, California, developed a suite of post-harvest treatments, including fumigation with phosphine, to control SWD in these commodities. These treatments including phosphine have directly resulted in the retention or expansion of export markets valued at over \$300 million annually.

Intelligent spraying system for nursery and orchard applications. Conventional spray application requires excessive amounts of pesticide to achieve effective pest control in floral, nursery, and fruit crop productions. ARS researchers at Wooster, Ohio, invented an automated, variable-rate, air-assisted, precision sprayer that minimizes human involvement in determining the amount of sprays needed for applications. This intelligent spraying system characterizes the presence, size, shape, and foliage density of target trees and applies the optimum amount of pesticide in real time. Field experiments have shown that the intelligent sprayer reduces

the variation in spray deposition due to changes in tree structure and species, and it increases the uniformity of spray deposition on targets at different growth stages. The pest control efficacies of the new sprayer are comparable to those of conventional sprayers, while the new sprayer reduces average pesticide use by 46-68 percent, for an annual average pesticide cost savings of \$230 per acre as well as provides an environmentally responsible approach.

Changing landfills into biorefineries. To provide more biomass sources between growing seasons, ARS researchers in Albany, CA developed a large pilot-scale biorefinery located at the Salinas, CA Crazy Horse Landfill. The biorefinery can convert both rural and urban solid waste into ethanol, biogas, compost, and/or value-added recyclables. As an example of the plant's efficiency, food processing waste at the landfill is currently converted into ethanol, yielding 65 gallons per ton. When the same biomass source is converted to liquefied natural (bio)gas—which has the same burn rate as ethanol—it yielded 108 gallons of the type of transportation fuel used to power diesel turbines. Together, ARS and the City of Salinas are creating an “energy park” that converts both agricultural biomass, as well as curb-collected garbage, into bioenergy using the same biorefinery, thus exhibiting remarkable flexibility in handling different feedstock supplies.

*Novel yeast strains reduce the price of biomass conversion to ethanol. Traditional yeasts convert sugars in cereal grains to ethanol, but these yeasts cannot use the pentose-sugar xylose, the second most abundant sugar in corn stover, switchgrass, and lignocellulose feedstocks. During conversion of sugars to ethanol, toxic conditions are generated which inhibit all yeasts. *Saccharomyces stipitis* is a native pentose-sugar fermenting yeast that ARS scientists in Peoria, IL, cultured in an ethanol-challenged continuous culture system to force targeted evolution of robust isolates. These isolates were able to overcome toxic conditions and produced ethanol using either highly acid- or base-pretreated corn stover or switchgrass. The novel yeast strains had reduced growth lag time; significantly enhanced fermentation rates; improved ethanol tolerance and yield; reduced diauxic lag during glucose-xylose transition; and rapidly and economically generated recoverable ethanol at acidic pHs. As a result of the improved features, the new strains allow a \$0.31/gal ethanol savings in selling price compared to the parent strain, an accomplishment that advances our progress toward national goals for renewable fuels to stimulate the rural economy, preserve the environment and reduce dependence on foreign oil.*

New amendment to reduce ammonia emissions and phosphorus runoff in poultry manure. Two of the biggest sources of pollution from animal manure are excessive ammonia emissions and phosphorous runoff. ARS researchers at Fayetteville, AR have developed a new manure amendment that greatly reduces both ammonia volatilization and soluble phosphorous levels in manure. An acidified waste product used in forming aluminum sulfate (alum) is alum mud. Currently this waste product is landfilled at a cost of over \$30 per wet ton. However, when mixed with bauxite and sulfuric acid, it forms a new manure amendment that works as well as alum in reducing ammonia volatilization and reducing soluble phosphorous, but at half the cost. A patent application covering this technology was submitted to the U.S. Patent Office in July. If 20% of the poultry producers used this technology, it is estimated that up to \$40 million in savings could be achieved each year while reducing ammonia emissions and phosphorus runoff from poultry farms.

Sustainable screwworm eradication through biotechnology for smart animal agriculture. Infestations with immature screwworms (maggots) devastated the United States livestock industry until screwworms were eradicated in the 1960s using a sterile male release technique. The use of a sterile insect technique is used to this day to prevent re-entry of screwworms from South America. To utilize the sterile insect technique, mass production, sterilization using low-dose radiation, and the release of millions of sterilized, adult male screwworms is employed at a cost of millions of dollars annually. ARS scientists at Kerrville, Texas, in collaboration with scientists at North Carolina State University, used genetic techniques to produce male-only screwworms, thereby making the rearing and release program more efficient and affordable. Maintaining an

effective barrier against screwworms re-entering the United States ensures benefits exceeding \$1.5 billion annually for North American livestock producers.

Enhancement of the beef carcass grading camera system to predict meat tenderness. Variation in the tenderness of beef results in consumer dissatisfaction; therefore, companies want technology to identify carcasses that excel in tenderness. ARS scientists in Clay Center, Nebraska, worked with the instrument manufacturer and beef industry to develop a system that uses a robust regression equation to extract information from digital images to predict tenderness at the time of beef carcass grading. This system has obtained approval from USDA's Agricultural Marketing Service, and the technology gives the beef industry a potentially more efficient way to measure USDA quality grade, yield based on grade, and tenderness. This application has been instituted in one packing plant, and other plants are considering implementation of this camera-based system. This new system is also expected to offer consumers a better way to select higher-quality meat.

4. Accomplishment written for a specialist, not the general public:

"Assessment of Cellular Responses Against Edwardsiella (E.) ictaluri. Edwardsiella ictaluri, the causative agent of enteric septicemia in channel catfish, accounts for considerable economic loss to the aquaculture industry. The result of the interactions of catfish macrophages with E. ictaluri revealed that only macrophages from AQUAVAC-ESC immunized catfish were efficient in killing E. ictaluri. Macrophages from nonimmunized fish allowed both the internal survival and replication of E. ictaluri. The macrophages from immunized catfish had increased levels of killing agents, reactive oxygen species and nitric acid. The AQUAVAC-ESC vaccine, developed by Agricultural Research Service (ARS) and licensed was demonstrated to protect fish by enhancing macrophage killing activity."

5. Example of accomplishment as written below is really progress, not an accomplishment:

"Anaerobic soil disinfestation as an alternative to methyl bromide fumigation. A cooperative research project with the University of California, Santa Cruz has resulted in the generation of new information on a technique that utilizes the combination of composted broiler litter and a carbon source with soil saturation and heating to create an anaerobic condition that induces weed, nematode, and soilborne plant pathogen control. Greenhouse and field trials conducted by California cooperators allowed for the identification of an optimal approach for Florida trials in which multiple water levels were tested with molasses and broiler litter. When soil was amended with both litter and molasses, the effect on anaerobicity was stronger than that of either broiler litter or molasses alone. This approach was successful using a previously formed false bed. Control of yellow nutsedge emerging through the plastic early in the season in plots receiving the combination was equivalent to methyl bromide. At pepper harvest there were few significant differences between ASD treatments and the untreated check with regard to nutsedge emerging through the plastic. However, total weed biomass harvested from transplant holes at pepper harvest indicated that weeds in treatments including amendment with either molasses or broiler litter, regardless of applied irrigation, were controlled as well as with methyl bromide. Weed control with solarization alone was also better than the untreated check, though not equivalent to methyl bromide. Control of Phytophthora capsici, introduced in buried inoculum in nylon mesh bags, was equal to that of methyl bromide for all treatments except the untreated check. There was an indication of increased numbers of non-pathogenic, beneficial nematodes in some treatments. The weed control observed during the bell pepper trial was maintained during the eggplant double crop."

6. Too much detail in accomplishment..should be summarized:

*“Tool developed to simultaneously assay thousands of grape genes: *Penicillium expansum* and *Colletotrichum acutatum* cause postharvest decay of apple fruit resulting in significant economic losses during storage. However, little resistance to both pathogens exists in the domesticated apple gene pool. Therefore, a collection of wild apple (*Malus sieversii*) germplasm from Kazakhstan (apple center of origin), located and maintained at PGRU was evaluated by ARS scientists in Kearneysville, WV and Beltsville, MD for resistance. Fruits from over 175 Kazakh *M. sieversii* accessions were harvested at various stages of maturity and were wound-inoculated with conidial suspensions of *P. expansum* and *C. acutatum*. Twenty inoculated fruit per conidial concentration from each accession were incubated at 24°C for 5 (for *P. expansum*) or 6 days (for *C. acutatum*) and then evaluated for decay incidence and severity. For *P. expansum*, 7 accessions were classified as immune (no decay at both conidia concentrations), 38 as resistant (no decay at 103 conidia mL⁻¹), 142 as moderately resistant (lesions <10mm at conidia 103 mL⁻¹), and 3 as susceptible. For *C. acutatum*, 1 accession was categorized as immune, 12 were resistant, 97 were moderately resistant, and 65 were susceptible. Differences in individual host resistance against both pathogens were expected due to differences in fungal lifestyles exhibited by *P. expansum* and *C. acutatum*. Both resistant and immune Kazakh accessions can serve as a source of genetic material in breeding programs and may be used in molecular studies to identify the genetic component(s) of host resistance to these important postharvest pathogens.”*

7. Not an accomplishment:

“Field Studies of Grafted Tomato and Musk melon. Concluded with collaborators initial field studies on tomato and musk melon growth in fumigated and non fumigated soils. Data is currently being analyzed.”

8. Not enough information for accomplishment and no impact statement:

“Flame- and stain-resistant cotton. Epoxy-based chemical formulations and their reactions on cotton can serve as models for future (diversified) cotton fiber finishing technology, which may be applied to attain durable (wash-fast) flame- and stain-resistances of cotton fabrics.”

Question 5: Significant Activities that Support Special Target Populations:

Note: Question 5 should only be answered if there are activities that support special target populations. If none, it is okay to type “none”.

1. *“Hosted 34 Future Farmers of America high school students from the northern Appalachian Mountains of rural western NY. The students learned about strawberry breeding and production, and about protected cultivation methods, and observed the strawberries being grown in low-tunnels and open fields in late March.”*
2. *“A Specific Cooperative Agreement entitled “Vegetable Production in the Southeast: Promoting Conservation Tillage Systems to Increase Yields, Profitability, and Improve Soil Quality” with Tuskegee University was created to work with limited-resource vegetable growers selected from within the Black Belt or Prairie soil region of Alabama to: 1) develop vegetable cropping systems that increase soil organic carbon and improve efficiency of organic nitrogen applications; reduce soil compaction; and reduce nutrient and soil losses through runoff; 2) network with limited-resource farmers to improve their access to agronomic information; and 3) provide technical and analytical support for sustainable soil management to limited-resource vegetable producers. Additional details can be found in the annual report for this project.”*

3. *Scientists have participated in activities targeting minority, historically under-served operators/stakeholders including: 1) collaborator on a SARE grant awarded to 1890s institution Fort Valley State University, and a SARE grant awarded to this USDA, ARS station with Fort Valley State University listed as a co-principal investigator; 2) cooperator on Capacity Building Grants awarded to Fort Valley State University, Delaware State University, and Virginia State University; 3) participant in meetings of the Southern Consortium for Small Ruminant Parasite Control, attended by 1890s institute representatives from Fort Valley State University, North Carolina A&T State University, Delaware State University, and Hispanic-serving University of Puerto Rico; 4) collaborator with Virginia State University and Langston University on research projects involving small ruminant parasite control; 5) collaborator with University of Maryland Eastern Shore on implement to incorporate poultry litter into soil for fertilizer.*

Scientists have participated in activities targeting small farmers, including: 1) education of small ruminant extension agents and producers in the use of methods to control gastrointestinal parasites; 2) review panel for Southern Region SARE producer grants; 3) on-farm organic research in small ruminants at the Heifer Ranch of Heifer International, Perryville, Arkansas, and two private farms in Oklahoma; 4) preparation for a field day for small ruminant producers.

4. *Visited the fifth grade classes at Los Padres School, an elementary school in Salinas serving primarily Hispanic students, and presented lessons and experiments related to general plant and animal biology.*

Hired two Hispanic summer internship students from Hartnell College, a Hispanic-Serving Institution and local community college.

Contributed to two classroom presentations in four 5th grade classes at a local minority serving elementary school that has been adopted by our research station to provide science programming and field trips.

Question 6: Technology Transfer

New CRADA:

(NOTE: The Title and Cooperator fields are automatically inserted by the system. These do not need to be typed in to the “Description” field in Question 6.)

Title: DEVELOPMENT OF ANTIBODIES SPECIFIC FOR CITRUS TRISTEZA VIRUS FOR USE IN ELISA

Cooperator: (cooperator name)

Description: Development of antibodies specific for Citrus tristeza virus for use in ELISA

Transfer: Antibodies and antigens specific for Citrus tristeza virus for use in coating and detection of ELISA protocols.

Customer/User: Certification programs, research institutions, and diagnostic laboratories.

Impact/Outcome: Provides an economical means of detection Citrus tristeza virus by regulatory agencies and diagnostic laboratories as needed for management of tristeza disease.

Active CRADAs:

Title: THE IMPACT OF THE NEW HARVESTING TECHNOLOGY ON COTTON QUALITY

Cooperator: (cooperator name)

Description: Technology: A new system Pinnacle® has been developed by (cooperator name) that revolutionizes the way seed cotton is harvested and modularized in the field.

Transfer: Personnel of CQRS have tested the fiber and processed into yarn conducted all pertinent tests and reported the results to (cooperator). Preliminary results indicate that Pinnacle® harvested cottons have a slightly improved quality with respect to cotton grown side by side and harvested conventionally.

Customer/User: Principal beneficiaries are first the producer (farmer) for it should improve his efficiency and then the textile mills who can receive improved quality raw materials and finally the consumer.

Impact/Outcome: The technology has the potential for producing high quality cotton with lower cost and energy consumption.

Title: MECHANIZATION OF IN VIVO PRODUCTION OF ENTOMOPATHOGENIC NEMATODES IN TENEBRIO MOLITOR

Cooperator: (cooperator name)

Description: Technology: Insect-killing nematodes can be potent natural biopesticides capable of suppressing a range of economically important pests. Novel methods to enhance production methods for these nematodes are required to expand the usage of these promising biocontrol agents. This project is aimed at mechanizing and optimizing host insect and nematode production systems. Advancements have been made in vivo production of mealworms and nematodes for application in aqueous suspension or infected host cadavers.

Transfer: The novel production technology is being developed cooperatively with a private company, and thus direct commercial application will ensue with this company. Modest sales have already been initiated utilizing the technology. Three invention disclosures have been submitted based on the novel technology; these inventions will be used by the CRADA partner and or licensed to other commercial interests.

Customer/User: The target customers are primarily commercial biological control companies. Additionally, the scientific community will benefit from the development of the new methods in nematode biocontrol production, and the general public will benefit from greater access to environmentally sound biological pest control products.

Impact/Outcome: The novel technology translates into more efficient production of insect-killing nematodes as environmentally sound biological products for insect suppression. The improved technology leads to reduced costs and greater pest control efficacy.

Title: CORN CREAM FROM ALTERED FATTY ACID LINES

Cooperator: (cooperator name)

Description: Corn cream from altered fatty acid lines.

Transfer: Two isolations of corn grown in 2008 were delivered to the (cooperator name) pilot plant for processing into proprietary corn cream.

Customer/User: Corn cream from corn with healthier amino acid balances will be manufactured by (cooperator name) for use by food companies in various products, such as ice cream. Our corn will be grown by small farmers, some of whom will be organic.

Impact/outcome: Increasing levels of obesity in the American population is a contributing factor to the health care crisis in this country. Our corn combined with (cooperator name) technology will lead to healthier products in the marketplace. Providing the grain for this product will lead to increased profitability for organic and non-GMO corn farmers.

New/Active MTAs:

Description: Investigate the behavior and ecology of western corn rootworm larvae combined with applied aspects of its control.

Transfer: Western corn rootworm eggs and rearing expertise.

Customer/User: Cooperating scientists with (cooperator name).

Impact/Outcome: New scientific information to help manage western corn rootworm populations.

Description: Evaluate the efficacy of insect traits in new corn varieties.

Transfer: Western corn rootworm eggs and rearing expertise.

Customer/User: Cooperating scientists with (cooperator name).

Impact/Outcome: Provide growers with new corn varieties that resist feeding damage caused primarily by corn rootworm larvae.

Description/transfer: MTA for transfer of germplasm from the USDA breeding program to commercial producers. Germplasm will be used as a multiplier source for future salmon broodstock or commercial production.

Customer/User: Commercial Atlantic salmon producers

Impact/Outcome: This MTA was used to facilitate the transfer of salmon from ARS to commercial salmon producers through the industry's Maine Aquaculture Association. Utilization of improved germplasm will increase the profitability and sustainability of coldwater marine aquaculture in the U.S. and provide a quality seafood product to U.S. consumers.

Description: The materials will be shared with a researcher at the (cooperator name). The genes will be used in research related to biodiesel production in the Barbados nut shrub.

Technology: Efficient, economical production of biodiesel from plant oils requires maximization of oil yield per unit of land used to grow the plants, and requires that the oil made by the plants contains a suitable profile of fatty acids in the oil that will impart the desired properties to the fuel produced. DGAT genes are a necessary component for making any seed oil. Two DGAT genes from tung will be introduced into Barbados nut shrub, a promising biodiesel crop plant. Oil will be extracted from the seeds of the resulting plant lines, and analyzed for improved biodiesel qualities.

Transfer: DNA samples containing either tung DGAT1 or tung DGAT2, each present in a form compatible with introduction into cells of Barbados nut shrub, were sent to the collaborators.

Customer/user: This research is in the very early stages, but if successful, future users and customers could include all purchasers of biodiesel for use in automobiles or other motorized vehicles or equipment.

Impact/Outcome: Anticipated outcome is a better understanding of the utility of DGAT genes in the production of biodiesel oils, and plant seed oils in general, in commercially important oilseed crops. Specifically, one possible outcome will be the production of new varieties of nut shrub-derived biodiesel fuels with novel qualities and uses.

Invention Disclosures Submitted:

Title: (title of invention disclosure)

Description:

Technology: (description of the technology/title)

Transfer: Invention disclosure that will hopefully lead to a patent and commercialization by an irrigation system manufacturer.

Customer/User: The primary customer is a manufacturer of irrigation or irrigation control equipment. The secondary customer is the irrigation manager/agricultural producer who purchases and uses the system.

Impact/Outcome: The system has been shown to control irrigation, resulting in yields and water use efficiencies as good as or better than those possible using expensive and time-consuming scientific irrigation scheduling tools, such as the neutron probe, which are impractical for producers. Thus, the system will enable producers to more routinely obtain high yields and water use efficiencies, thereby improving environmental and economic sustainability of agricultural production. In addition, the technology can be tuned to produce larger water use efficiencies without severely limiting yields, which can allow a producer to improve nutrient use efficiency, decrease pumping costs, and find the economic sweet spot.

Patent Applications Filed:

Title: ELECTRONIC TERMITE DETECTION SYSTEM

Description: A new monitor to detect termites in structures.

Technology: New sensors coupled with electronic filtering and amplification allows early detection of termites in structures.

Transfer: Patent application filed 03/19/2009.

Customer/User: Pest Management Professionals/ Home monitoring services.

Impact/Outcome: Adoption of this technology would allow detection of termite infestations of structural wood at a very early stage, prior to disruption of structural integrity. This would allow pest management professionals to kill the termite infestation before significant damage to the structure.

Title: INSECTICIDES AND METHODS FOR KILLING INSECTS

Description: New chemistries that might form the basis for the development of natural products as termiticides.

Technology: A series of natural product chemicals and analogs that exhibit outstanding insecticidal activity, including termites.

Transfer: Patent application filed 09/08/2008.

Customer/User: Pesticide manufacturers.

Impact/Outcome: These chemicals form the basis for development of new classes of chemicals that may be used to control termites based on natural product chemistry. Further chemical modification could provide long-lived but environmentally benign chemicals that could be used to kill termite infestations or protect wood from termite attack.

New Commercial Licenses Granted:

Title: (cooperator name)

Description: Technology: Four ornamental pepper (*Capsicum*) germplasm releases were licensed to a major U.S. nursery, and are currently being propagated for projected commercial release in 2011. Patents have been issued on two of the licensed releases (all jointly with the Genetic Improvement of Fruits and Vegetables Laboratory; project Genetic Enhancement of Quality Constituents in Solanaceous Vegetables', 1275-21000-195-00D).

Transfer: Commercial licenses were issued.

Customer/User: A commercial nursery producing ornamental peppers and other crops.

Impact/Outcome: These releases are expected to be available for retail sale in 2011, expanding consumer choices for ornamental peppers.

Websites Managed:

<http://www.ars.usda.gov/mwa/cdl>:

The Cereal Disease Laboratory manages an extensive national system for tracking cereal rust onset and development in the U.S. The observations and biweekly rust bulletins are maintained in a searchable online database (from 1997 to present; bulletins from 1994 to present). Results of annual race surveys, germplasm evaluations (rust evaluations of cultivars and lines of annual national nurseries, Ug99 nurseries, etc. including gene postulations) and annual reports on losses due to cereal rust are available. Extensive fundamental information, e.g., identification and life histories of cereal rusts, catalog of rust resistance genes, comprehensive

bibliographies (cereal rusts, Fusarium head blight and Karnal bunt), alternate host barberry, Fusarium International Genomics Initiative project information, etc. is provide on the website. All information on the website is publicly available.

Transfer: Website had 38,855 visits (activity of one visitor) and 92,415 hits from June 1, 2009 to June 1, 2010.

Customer/User: Federal, state and local researchers, extension personnel, students, commodity and farm groups and the public. Over 400 individuals are subscribed to our Cereal Rust Survey and Cereal Rust Bulletin listserv lists.

Impact/outcome: Provides the most comprehensive source of information on the current and past cereal rust situations in the U.S. while facilitating access to cooperators around the U.S. Additionally, provides fundamental information on the cereal rusts, cereal rust resistance genes, germplasm evaluations, cereal rust resistance gene postulations, annual cereal rust race surveys, etc. necessary in the effort to minimize the impact of cereal rusts. This website is the central location for the Fusarium International Genomics Initiative project.

<http://entopl.okstate.edu/gbweb/>

Technology: Efficient greenbug pest management is critical to minimize economic losses to wheat growers caused by the pest. The "Greenbug Management Decision Support Tool" is a computer-based expert system that guides the user through the process of determining economic thresholds and obtaining field sampling data forms. Information on other aspects of greenbug pest management, such as biocontrol and insecticide selection, is also provided. Access to the expert system is free of charge to the general public.

Transfer: The Greenbug Management Decision Support Tool is available at <http://entopl.okstate.edu/gbweb/>.

Customer/User: The software is designed for crop consultants, wheat producers, and pest management scientists.

Impact/Outcome: We do not keep track of the number of people who access the website. However, we know that extension specialists throughout Oklahoma and Texas rely heavily on the system when greenbug outbreaks occur, and some train crop consultants and growers on its use.

<http://www.cottondb.org/>

Technology: CottonDB (<http://www.cottondb.org/>), a cotton database maintained by the project, provides detailed genomic, genetic, germplasm, and taxonomic information for cotton (*Gossypium* spp.). CottonDB serves as both an archival database and a dynamic resource for research activities.

Transfer: In FY 2009, the CottonDB website had over 100,000 visits and over 2,100,000 hits from users in over 50 countries.

Customer/User: Domestic and international cotton research community.

Impact/Outcome: Provides a single source site for diverse databases that support genomic and genetic investigations, and which will facilitate discoveries that will positively impact cotton improvement efforts and benefit the U.S. cotton industry and the consumer.

<http://icgi.tamu.edu>

Technology: The website <http://icgi.tamu.edu/> for the International Cotton Genome Initiative is cooperatively maintained by the project and Texas A&M University, and provides activity information, organizes biannual conferences, conducts organization elections, maintains membership lists and addresses, and provides a forum for membership communication.

Transfer: Website had more than 30,000 visits and more than 200,000 hits from users in FY 2009.

Customer/User: International cotton research community

Impact/Outcome: Facilitates global communication, technology and resource development and sharing, and coordinated research planning that positively impact basic cotton genome and genetics research.

www.tucson.ars.ag.gov/awgwa

Technology: Automated Geospatial Watershed Assessment (AGWA)

Transfer: AGWA Web Site(www.tuscan.ars.gov/agwa)-includes software, documentation, tutorials, presentations, and publications.

Customer/User: Other Federal, local and state government agencies; consultants, researchers and graduate students

Impact/Outcome: To date, over 1500 users from 85 countries for AGWA 1.5 and 945 users from 110 countries have registered and downloaded the AGWA 2.0 software. AGWA has become an accepted tool within the environmental management and protection community and has been used with significant positive impact within the past three years with formal adaption by branches of EPA and NASA in addition to extensive use by USDA, USDOl, and DOC (NWS) and by consultants and research investigators and students. AGWA received the ARS 2008 Technology Transfer Award presented in Feb. 2009.

Other Technology:

Technology: Integrated Farm System Model, a farm simulation model useful for evaluating and comparing integrated crop, dairy or beef production systems.

Transfer: Internet distribution

Customer/User: Scientists, educators, farm consultants and producers interested in studying management effects on farm performance, environmental impact and profitability.

Impact/outcome: Over 330 copies of the software tool were distributed during the past year for use in classroom teaching and individual evaluation of farming systems.

Technology: Wind Erosion Prediction System (WEPS) model.

Transfer: 60+ copies of the WEPS model were downloaded via the internet.

Customer/User: The customers ranged from NRCS personnel, university researchers and educators, private consultants, and national, state and local government agencies from over 16 countries.

Impact/Outcome: Expanded use of the WEPS model for conservation planning, environmental assessments, and developing control strategies.

Technology: The Beta WinDAMb (Windows Dam Analysis Modules for breach) model used for evaluating earthen embankments during overtopping in flood stages to predict potential erosion and failure.

Transfer: Training/testing sessions held at the USDA-ARS Hydraulic Engineering Research Unit in Stillwater, Oklahoma, to teach engineers about the technology behind the model, how to set up data sets, how to run the model, and how to test the model.

Customer/User: Engineers from the USDA Natural Resources Conservation Service.

Impact/Outcome: The model and components of the model are being developed to predict erosion and failure of embankments during overtopping flooding.

Technology: The ALMANAC (Agricultural Land Management Alternatives with Numerical Assessment Criteria) model used for simulating grasses, especially switchgrass for biofuel.

Transfer: Training sessions held at Temple to teach researchers how to set up data sets and run the model.

Customer/User: Researchers at University of Tennessee, University of Missouri, University of Illinois, and University of Nevada at Reno.

Impact/Outcome: The model and components of the model are being used to assess the feasibility and impact of switchgrass production on a range of soils in different regions of the U.S. to assess impacts of NRCS programs on range sites in the Intermountain West, and to determine the optimal sites of growing plant varieties produced by USDA-NRCS Plant Materials Centers in the Intermountain West.

PLEASE NOTE: The two numerics for invited talks, conferences, presentations, etc., were eliminated as the information was not being used, so we did not want to waste the scientists' time. If the scientists still want to provide the information, it should be summarized as shown below, not as individual entries for each item.

Technology: Understanding the current use and future potential of natural products in pest management.

Transfer: Thirteen invited symposium presentations, plenary presentations or other oral presentations at regional, national and international conferences were presented. Travel for most of these presentations was paid by the inviters. Conferences and meetings were:

- Herbicide Resistance Congress, Perth, Australia (most expenses paid by organizers).
- Informa Plant Biotechnology USA conference in Raleigh, NC (Most expenses paid by organizers).
- Symposium presentation at American Chemical Society meeting in Indianapolis, IN (most expenses paid by ACS).
- Plenary presentation at 4th International Symposium on Pesticide and Environmental Safety, Beijing, China (expenses paid by organizers).
- Seminar at the University of Aarhus, Denmark (all expenses paid by organizers).
- Seminar at Monsanto HQ, St. Louis, MO – Expenses paid by Monsanto.
- Symposium presentation at World Malaria Day Symposium, Oxford, MS.
- Oral presentation at Weed Science Society of America meeting in Baltimore, MD.
- Presentation at California Weed Science Society meeting (all expenses paid by organizers).
- Oral presentation at Southern Weed Science Society meeting in Houston, TX.
- Oral presentation at annual Deployed War Fighter Protection meeting in Oxford, MS.
- Seminar at Colorado State University (CSU) (expenses paid by CSU).
- Seminar at Water Management Research Unit, Ft. Collins, CO.

Customer/User: Other scientists, students and pest management industry.

Impact/Outcome: Transfer of information on new pest management.

Technology: Understanding crop responses to global atmospheric change

Transfer: One invited conference talk, four conference posters, five presentations for non-science audiences, guest lectures at the University of Illinois Plants and Global Change course

Conferences:

- American Society of Plant Biology Annual Meeting, Honolulu, HI
- Ecological Society of America Annual Meeting, Albuquerque, NM
- Effects of Climate Change on Plants: Implications for Agriculture at Rothamsted, United Kingdom

Non-science audiences:

- REACT: Reaching and Educating America's Chemists of Tomorrow speaker
- Girl Scout Troups
- Farmer Groups from Argentina
- Illinois Soybean Association
- Ag Roundtable Group
- Tribal communities of the Great Lakes Basin

Customer/User: Other scientists, students, producers, general public

Impact/Outcome: Informed understanding of climate change anticipated in 2050, and crop responses to climate change.

Question 7: International Cooperation/Collaboration:

Argentina

ARS scientists from the Sugarcane Research Unit in Houma, Louisiana, have conducted an informal collaborative study with colleagues at the National University of Tucuman in Tucuman, Argentina. The overall objective of this continuing collaboration is to investigate if varieties from the Houma and Tucuman sugarcane breeding programs possess tolerance to different type of residue management

treatments. The work has been ongoing for three years both in Argentina and in Louisiana. Greenhouse and field experiments were harvested, and preliminary data shows differential varietal responses to post-harvest residue retention.

Brazil:

A proposal was written and accepted to fund a post-doc to spend one year at our laboratory. The post-doc will be funded by the Brazilian national agricultural research agency, EMBRAPA. The collaborative research encompasses development of a GIS coupled with a simulation model to estimate corn and soybean yields in the Upper Mississippi Valley of the U.S. under current and elevated CO₂ conditions. Once the methodology is perfected, the approach will be transferred to Brazilian agricultural lands.

Rep of Korea:

An ARS scientist from the Davis location has conducted an informal collaborative study with colleagues at Gwangju Institute of Science and Technology, Gwangju, Korea. The overall objective of this continuing collaboration is to examine the inhibitory effects of phytochemicals on induction of inflammation via activation of immune cells in culture. These study will improve the scientific basis of US dietary guidelines pertaining to decreasing the risk of chronic inflammatory disease by making appropriate food choices. This year the collaborating scientists found that the plant polyphenol isothiocyanate decreased activation of inflammation by inhibiting a sensory molecule on immune cells, toll like receptor 4 (TLR4), that detects microorganisms and initiates transcription of proinflammatory genes. This activity was inhibited. The bench work was conducted in Korea and scientists communicated via e-mail and one visit by the Korean investigator to Davis.

Japan:

An ARS scientist at the Davis location is conducting informal, collaborative research with a scientist at the National Institute of Advanced Industrial Sciences and Technology, Osaka, Japan. The immediate goal of the research is determine the impact of dietary interventions with different types of fatty acids on lipid peroxidation in plasma and red blood cells. The overarching goal of the project is to help define how dietary patterns associated with chronic disease affect physiologic process, such as lipid peroxidation, that may directly or indirectly (e.g., by triggering inflammation) cause tissue damage and lead to development of disease, such as diabetes. Samples from experiments conducted by the ARS with in-house funds in Davis were sent to Osaka for analysis and data were sent electronically to Davis for statistical analysis. The collaboration was conducted largely via e-mail but the collaborating scientist from Osaka visited Davis this year for face-to-face discussions.